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EMPATHIC AND SOCIO-COGNITIVE DEFICITS OF ADJUDICATED  
ADOLESCENTS: DIFFERENCES BY GENDER AND CALLOUS-UNEMOTIONAL  
TRAITS

A Dissertation Presented

by

Laurie B. Kaufman

to

The Faculty of the Graduate College

of

The University of Vermont

In Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy  
Specializing in Clinical Psychology

October, 2007

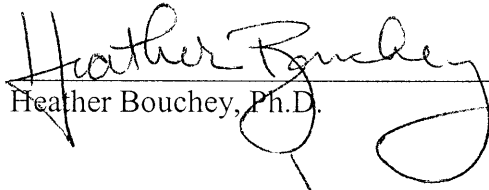
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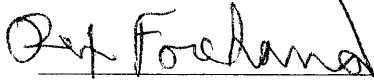


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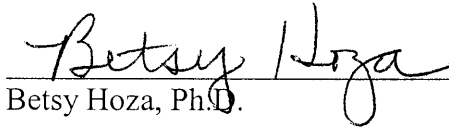
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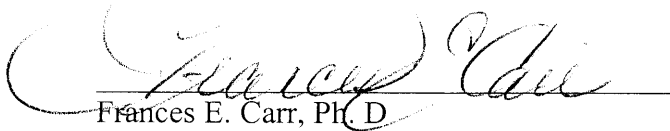


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## Abstract

Previous studies of youth antisocial behavior have explored relationships between social information processing, empathy, or callous-unemotional traits and antisocial behavior. However, the relationships among all four constructs have not been tested. The current study investigates whether social information processing mediates the relationship between empathy and antisocial behavior for adjudicated youth ( $n=150$ , mean age = 15.21 years,  $SD = 1.40$  years, range = 11-17), whether callous-unemotional traits moderate that mediation, and how the relationships differ for girls and boys. Youth were assessed individually at two detention centers and the staff and teachers at the detention centers completed written measures. There was support for a three-factor model of empathy consisting of perspective taking, empathic concern, and personal distress. For both girls and boys, lower perspective taking and empathic concern predicted deficits in social information processing and higher self-reported antisocial behavior. For girls, higher personal distress also predicted deficits in social information processing and higher antisocial behavior. Youth high and low on callous-unemotional traits differed on empathy, SIP, and antisocial behavior, indicating support for distinct subtypes of antisocial adolescents. Differences among antisocial adolescents by gender and callous-unemotional subtype indicate a need for tailored interventions.

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## Table of Contents

Acknowledgements .....	ii
List of Tables .....	vi
List of Figures .....	ix
Introduction .....	1
The Impact of Antisocial Behavior on Society .....	1
Developmental Pathways in the Onset of Antisocial Behavior .....	2
Social Information Processing .....	9
Antisocial Behavior and Empathy .....	14
Hypotheses .....	19
Methods .....	21
Participants .....	21
Procedure .....	22
Measures .....	24
Demographics .....	24
Empathy .....	24
Social Information Processing .....	25
Callous-Unemotional Traits .....	26

Antisocial Behavior Outcomes .....	27
Prior Beliefs About Aggression .....	28
Multiple Informant Data .....	28
Preliminary Analyses .....	30
Data Cleaning and Screening.....	30
Confirmatory Factor Analysis.....	31
Group Differences and Hypothesis 1 .....	32
Results.....	35
Hypothesis 2.....	35
Youth Self-Reported Antisocial Behavior .....	37
Highest-Rater Antisocial Behavior .....	40
Hypotheses 3 .....	41
Hypothesis 4.....	42
Discussion.....	43
Empathy Domains of the IRI .....	43
SIP as a Mediator .....	45
Subtypes of Youths by CU Traits .....	48
Gender Differences .....	50

Multiple Informant Agreement .....	51
Other Limitations .....	53
Clinical Implications .....	53



## List of Tables

Table 1. Means and Standard Deviations of Demographic Variables for Girls and Boys	57
Table 2. Number of Girls and Boys of Each Ethnic Group .....	57
Table 3. Means and Standard Deviations of IRI Scales for Adjudicated and Normative Samples .....	58
Table 4. Means and Standard Deviations of SIP, Antisocial Behavior, and Callous- Unemotional.....	59
Table 5. Correlations Between Age, Empathy, and All Study Variables for Girls .....	61
Table 6. Correlations Between SIP Stages and Antisocial Behavior Outcomes for Girls	62
Table 7. Correlations Between Antisocial Behavior Outcomes for Girls.....	63
Table 8. Correlations Between Age, Empathy, and All Study Variables for Boys .....	64
Table 9. Correlations Between SIP Stages and Antisocial Behavior Outcomes for Boys	65
Table 10. Correlations Between Antisocial Behavior Outcomes for Boys .....	66
Table 11. Means and Standard Deviations for the Six Categories of Aggressive Response Choices for Girls and Boys .....	67
Table 12. Correlations Between Empathy and Aggressive Response Choices for Girls..	68
Table 13. Correlations Between Empathy and Aggressive Response Choices for Boys .	69
Table 14. Hostile Attribution Bias Mediates the Relationship Between Perspective Taking and Aggressive Response Choices for Girls and Boys, Controlling for CU Traits .....	70

Table 15. Access of Aggressive Responses Mediates the Relationship Between Perspective Taking and Aggressive Response Choices for Girls and Boys, Controlling for CU Traits.....	70
Table 16. Hostile Attribution Bias Mediates the Relationship Between Personal Distress and Aggressive Response Choices for Girls Only, Controlling for Callous- Unemotional Traits .....	71
Table 17. Access of Aggressive Responses Mediates the Relationship Between Personal Distress and Aggressive Response Choices for Girls Only, Controlling for Callous- Unemotional Traits .....	71
Table 18. Expectation of Punishment Mediates the Relationship Between Empathic Concern and Aggressive Response Choices for Girls and Boys .....	72
Table 19. Expectation of Tangible Rewards Mediates the Relationship Between Empathic Concern and Aggressive Response Choices for Girls and Boys .....	72
Table 20. Personal Distress Predicts Expectation of Punishment for Girls and Boys, Controlling for Callous-Unemotional Traits.....	73
Table 21. Personal Distress Predicts Expectation of Tangible Rewards for Boys Only, Controlling for Callous-Unemotional Traits.....	73
Table 22. Prior Beliefs about Aggression Predict Aggressive Response Choices for Girls and Boys.....	73
Table 23. Callous-Unemotional Traits Predict Proactive Aggression for Girls and Boys	74
Table 24. Callous-Unemotional Traits Predict Reactive Aggression for Girls and Boys	74
Table 25. Callous-Unemotional Traits Predict Aggressive Behavior for Girls and Boys	74

Table 26. Callous-Unemotional Traits Predict Delinquent Behavior for Girls and Boys	75
Table 27. Fantasy Predicts Aggressive Behavior for Girls.....	75
Table 28. Means and Standard Deviations for Girls With Low, Medium, and High	
Callous-Unemotional Traits.....	76
Table 29. Means and Standard Deviations for Boys With Low, Medium, and High	
Callous-Unemotional Traits.....	77

## List of Figures

Figure 1. The hypothesized moderated mediation model.....	78
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## Introduction

### The Impact of Antisocial Behavior on Society

Antisocial behavior associated with a diagnosis of conduct disorder is one of the most common reasons that children and adolescents are referred to mental health professionals or residential treatment centers (Frick & Silverthorn, 2001). Antisocial behavior includes a range of aggressive and delinquent behaviors, from verbal confrontations with peers and vandalism of public property to physical assaults, theft, and involvement with illegal drugs. Antisocial behaviors result in emotional damage to families, schools and communities, who also bear the financial costs of destroyed property. Antisocial behavior by the most severely or chronically antisocial adolescents may also lead to their involvement in the juvenile justice system and adjudication (Cohen, Miller, & Rossman, 1994; Cohen, 1998). The high price of youths' antisocial behavior and the dramatic increases in juvenile delinquency during the 1980's and 1990's have led to increased interest in effective interventions for antisocial behavior in youths (Lochman, Barry, & Pardini, 2003).

Many of the best available treatment interventions, although empirically supported, are only minimally effective (Brestan & Eyberg, 1998). This limited effectiveness may be because most treatments focus only on the outcome of antisocial behavior or on one or two of the multiple causal factors leading to antisocial behavior, rather than on antisocial adolescents' heterogeneous risk factors such as their different patterns of emotional and socio-cognitive processing. Within the population of antisocial

adolescents, different patterns of emotional and socio-cognitive processes may be related to different developmental pathways for which there appear to be different underlying causal factors. Consequently, understanding antisocial adolescents' patterns of abilities and deficits is an essential step for refining interventions that are tailored to their strengths and vulnerabilities. Such an approach may lead to interventions that are more effective in reducing antisocial behavior (Stickle & Frick, 2002).

#### Developmental Pathways in the Onset of Antisocial Behavior

Adolescents may exhibit similar antisocial behaviors even though they have experienced different developmental pathways leading to those antisocial outcomes. These different developmental pathways to adolescent antisocial behavior indicate different underlying causal factors and different prognoses regarding level and severity of antisocial behavior. One key difference in the development of antisocial behaviors in adolescence is the age of onset of these antisocial behaviors.

Specifically, there are differences in the developmental pathways and prognoses of youths who begin to engage in antisocial behaviors in childhood (before age 10) and those who begin in adolescence. Previous research indicates that boys with a child-onset of antisocial behavior differ fundamentally from those with an adolescent-onset. Evidence indicates that differences in age of onset of antisocial behavior are associated with differences in contributing causal factors, empathic and cognitive characteristics, and the severity and persistence of the behaviors (e.g. Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005; Moffitt, Caspi, Harrington, & Milne, 2002; Stickle & Frick, 2002).

The age of onset of antisocial behavior seems to be one result of differences in developmental trajectories, beginning with children's temperamental characteristics and childhood experiences. Predictors of child-onset antisocial behavior include temperamental characteristics of the child, such as fearlessness or inattention, and childhood experiences, such as suboptimal parenting resulting from dysfunction and psychopathology in the family (Lahey, Loeber, Quay, Applegate, Shaffer, Waldman et al, 1998; Silverthorn & Frick, 1999). In contrast, boys who begin exhibiting antisocial behavior in adolescence are more likely to exhibit characteristics such as greater-than-normal adolescent rebellion and to experience higher levels of peer pressure, rather than specific early childhood experiences or negative family characteristics (Frick & Ellis, 1999). Boys with child-onset antisocial behavior exhibit behaviors that are more severe in intensity and more likely to persist into adulthood than boys with adolescent-onset antisocial behavior (Frick et al, 2005; Lahey et al, 1998; Moffitt et al, 2002).

Differences in these age-of-onset patterns are well established for boys, but girls appear to exhibit very different patterns in the onset of their conduct problems. Although girls generally begin exhibiting antisocial behavior later than boys, antisocial girls appear similar to child-onset boys. Specifically, the temperamental characteristics, early family environments, antisocial behaviors, and long-term outcomes of girls with adolescent-onset antisocial behavior are more similar to boys with child-onset antisocial behavior than to boys with an adolescent-onset (Silverthorn & Frick, 1999; Silverthorn Frick, & Reynolds, 2001). In contrast to boys, however, a later onset of antisocial behavior does not seem to be associated with more favorable outcomes for girls. That is, adolescent-

onset girls show a pattern of antisocial traits (Silverthorn & Frick, 1999), referral to outpatient mental health clinics, and residence in inpatient clinics or juvenile detention centers (Lahey et al, 1998) similar to early-onset boys. For example, in a sample of adjudicated adolescents, Silverthorn et al (2001) found that nearly all of the girls exhibited an adolescent-onset pattern of antisocial behavior, whereas the boys were evenly split between child and adolescent onsets of antisocial behavior. To differentiate girls and boys with adolescent-onset antisocial behavior, Silverthorn and Frick (1999) proposed the use of the term “delayed-onset” conduct problems to describe this subgroup of girls.

Thus, despite differences in ages of onset, the most severely and persistently antisocial boys and girls share similar patterns of behavior and outcomes. One characteristic exhibited by both girls with severe antisocial behavior and boys with child-onset antisocial behavior is a particular pattern of antisocial traits (Silverthorn & Frick, 1999; Stickle & Frick, 2002). Within the most severe antisocial adolescents, researchers have found evidence of two subtypes of youths. Youth within these subtypes, characterized by those youth with high levels of Callous-Unemotional traits (CU) and those with primarily Impulsive Conduct Problems (ICP), differ in temperament, environmental factors such as parenting, and types and severity of antisocial behavior (Frick, Cornell, Bodin, Dane, Barry, & Loney, 2003; Frick et al, 2005; Pardini, Lochman, & Frick, 2003). CU traits refer to a unique style of affective and interpersonal characteristics. Youth high on CU traits lack emotional reactivity and fearful inhibitions, are less responsive to punishment, and use others for their own gain (Frick et al, 2003;



Stickle & Frick, 2002), similar to adult psychopaths (Loney, Frick, Clements, Ellis, & Kerlin, 2003).

CU youths differ from ICP youths primarily based on the presence or absence of CU traits. Although the names of the subtypes imply levels of impulsivity, CU traits and impulsivity are not mutually exclusive. Youths who engage in antisocial behavior may exhibit CU traits alone, impulsivity alone, or CU traits and impulsivity (Frick et al, 2005). However, studies have consistently found that the presence of CU traits, regardless of the presence of impulsivity, predicts increased severity and persistence of antisocial behavior (Blair, 1999; Frick et al, 2003; Frick et al, 2005; Loney et al, 2003). Thus, for the purposes of this study, CU adolescents are those with high levels of antisocial behavior and high levels of CU traits, regardless of impulsivity, and ICP adolescents are those with high levels of antisocial behavior but low levels of CU traits. Despite the fact that many studies of CU traits have been conducted only with boys (e.g. Blair, 1999; Hawes & Dadds, 2005), CU and ICP subtypes seem to accurately differentiate both girls and boys (Frick et al, 2003; Frick et al, 2005; Pardini et al, 2003).

Research on these two subtypes, instead of focusing solely on the outcome of antisocial behavior, focuses on the multiple factors influencing the developmental pathways that lead to antisocial behavior. CU and ICP adolescents experience very different developmental pathways to the outcome of antisocial behavior. What the two subtypes share is the combination of temperamental vulnerability interacting with a less-than-favorable context, although their temperaments and contexts differ (Frick & Ellis, 1999).

ICP adolescents exhibit unique patterns with regard to their temperament, socio-cognitive and emotional processing, and childhood environments. In terms of temperament, ICP adolescents are more likely to have exhibited an impulsive/overactive temperament as children, in combination with deficits in verbal abilities. ICP adolescents exhibit deficits in both socio-cognitive and emotional processes, including higher personal distress in difficult situations, than do CU adolescents or non-antisocial adolescents. That is, they become more upset and unable to think clearly or to think about others' perspectives when they experience arousal of negative affect (Frick & Ellis, 1999; Pardini et al, 2003). These ICP youth are also more likely than non-antisocial or CU adolescents to exhibit inattentive and hyperactive symptoms as children and adolescents (Dodge, Harnish, Lochman, Bates, & Pettit, 1997). ICP adolescents are more likely than CU adolescents or other adolescents to have had chaotic, hostile, or abusive childhood experiences. Lack of a stable and nurturing childhood may increase the likelihood of insufficient socialization (Kochanska, 1997), leading to a lack of internalization of societal and cultural norms. This inadequate socialization may contribute to ICP adolescents' emotional and socio-cognitive deficits, including beliefs about the acceptability of antisocial behavior (Miller & Eisenberg, 1988).

In contrast to ICP adolescents, CU youths exhibit low levels of negative arousal and more severe antisocial behavior. Characteristics of CU adolescents' childhood environments do not seem to predict their antisocial behavior. However, CU adolescents may have experienced early deficits in the development of emotional processes. Previous research has suggested that, as children, CU youth tend to experience lower negative

arousal in response to others' distress (Hoffman, 1975) or lower anxiety when faced with negative consequences (Frick & Ellis, 1999; Kochanska, 1997; Stickle & Frick, 2002). CU youths' failure to experience normal negative arousal may impair the later development of guilt and other-oriented empathy (Hoffman, 1975). CU youths' low levels of negative arousal are also thought to be related to both low behavioral inhibition, such as engaging in thrill-seeking behaviors, and also low fearfulness, including responsiveness to rewards and other positive outcomes, but not to punishment (Frick et al, 2003; O'Brien & Frick, 1996). Overall, youths high on CU traits exhibit more frequent, severe, and persistent antisocial behavior than youths low on CU traits (Moffitt et al, 2002; Frick et al, 2005).

Although the subtypes of CU and ICP seem to describe differences among both girls and boys with antisocial behavior, there are gender differences in the amount and type of antisocial behavior that adolescents exhibit. Past studies have found that girls exhibit less antisocial behavior than boys (Broidy, Cauffman, Espelage, Mazerolle, & Piquero, 2003; Richardson, Hammock, Smith, Gardner, & Signo, 1994; Zelli, Dodge, Laird, Lochman, & the Conduct Problems Prevention Research Group, 1999), and that girls and boys exhibit different types of antisocial behavior. For instance, there has been a large body of research within the peer relations literature on physically aggressive versus non-physically aggressive types of antisocial behavior. Many studies have found that boys exhibit more physical aggression, whereas girls exhibit more relational aggression (e.g. Crick & Grotpeter, 1995; Werner & Crick, 2005; Zimmer-Gembek, Geiger, & Crick, 2005), also called social aggression (Galen & Underwood, 1997) or indirect

aggression (Bjorkqvist, Lagerspetz, & Kaukiainen, 1992). However, several studies have found that although boys overall exhibit higher levels of aggression than girls, boys also exhibit high levels of relational aggression (Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001; Underwood, Galen, & Paquette, 2001).

It is likely that gender differences in both the amount and type of antisocial behavior change as children mature. Most studies of gender differences in aggression have been based on children in elementary school or in early adolescence (e.g. Crick & Grotpeter, 1995). Research on the developmental trajectories of antisocial behavior has indicated that, although girls exhibit less antisocial behavior in childhood, boys' and girls' levels of antisocial behavior are comparable by mid-adolescence (McGee, Feehan, Williams, & Anderson, 1992). The comparable rate of antisocial behavior of girls and boys in adolescence is consistent with the "delayed onset" trajectory of antisocial girls described earlier.

The present study focused on differences in antisocial behavior among subgroups of antisocial adolescents: male and female and CU and ICP. In order to understand differing vulnerabilities to these patterns of antisocial behavior, this study also examined differences in two processes that influence antisocial behavior: empathy and socio-cognitive processing (see Figure 1). One particularly useful model for understanding socio-cognitive processes is called Social Information Processing (SIP).

## Social Information Processing

The outcome of antisocial behavior, or any other social behavior, is in part the result of on-line socio-cognitive processing. Social Information Processing (SIP) models describe the on-line process by which thoughts and judgments about social events become behaviors. SIP models (Crick & Dodge, 1994; Huesmann, 1998) outline the cognitive steps between a social event occurring and a youth responding to that event. For example, if a boy bumps into a classmate on the line to buy lunch in the cafeteria, the classmate could process that information and respond in a number of ways, including antisocial or prosocial responses. The SIP model describes a sequence of stages beginning when a youth 1) attends to and interprets social cues and 2) accesses potential responses to the situation from a remembered repertoire. The youth then 3) evaluates potential responses based on expected outcomes and 4) chooses and enacts antisocial or prosocial behaviors. The first two SIP stages involve what Huesmann (1998) calls automatic processes, meaning they occur very quickly and are related to emotional states such as negative arousal. In contrast, the later two SIP stages involve cognitively weighing options, including considering possible consequences.

It is likely that different subgroups of antisocial adolescents - girls and boys, CU and ICP youths – will also exhibit differences in the stages of SIP. As described above, these subgroups of antisocial adolescents experience different pathways to the outcome of antisocial behavior, which are characterized by different patterns of deficits in socialization or social knowledge structures. For example, previous research has shown that SIP biases mediate between social knowledge structures such as beliefs about the

acceptability of aggression, and antisocial behavior (Stickle, Kirkpatrick, & Brush, 2007; Zelli et al, 1999). The SIP model seems to accurately describe the sequence of stages for both girls and boys in social situations (Crick & Dodge, 1994; Fontaine, Burks, & Dodge, 2002; Pettit, Dodge, & Brown, 1988; Slaby & Guerra, 1988), although specific gender differences in these on-line processes have not been studied in depth. Differences in the emotional and cognitive characteristics of ICP and CU adolescents suggest that these two subtypes will exhibit differences between early and later stages of SIP.

Specifically, ICP adolescents' patterns of emotional and socio-cognitive deficits seem to be more strongly related to deficits in the early stages of SIP. Youths exhibit deficits in socio-cognitive processing primarily when they are distressed and faced with an ambiguous situation (Waldman, 1996). When distressed, youths exhibit difficulty interpreting social cues (Muris, Merckelbach, Schepers, & Meesters, 2003) such as decoding verbal or nonverbal messages or determining others' intentions in ambiguous social situations (Frick et al, 2003). Greater personal distress contributes to the narrowing of youths' attention to only the most salient cues (Huesmann, 1998; Lemerise & Arsenio, 2000), which limits their abilities to accurately interpret social information. ICP adolescents exhibit high levels of personal distress and negative arousal, and therefore are also likely to experience difficulty interpreting ambiguous social situations. In particular, ICP adolescents exhibit hostile attribution biases, tending to interpret malicious intent in ambiguous or non-hostile interactions (Frick et al, 2003; Pardini et al, 2003).

Hostile attribution biases (Hubbard, Cillessen, Dodge, Coie, & Schwartz, 2001; Little, Jones, Henrich, & Hawley, 2003) and negative arousal (Frick & Ellis, 1999) are

related to antisocial behavior, specifically to reactive aggression. Reactive aggression, also called retaliatory or hostile aggression, is aggressive retaliation in response to a perceived threat, injustice, or frustration (Dodge et al, 1997). Perceiving another's intentions as hostile rather than non-hostile more than doubles the likelihood that youths will exhibit antisocial behavior (Waldman, 1996). Hostile attribution biases appear to lead to antisocial behavior by leading youths to consider a narrower range of possible responses (Huesmann, 1998; Lemerise & Arsenio, 2000), usually without consideration of the consequences (Pardini et al, 2003). For example, ICP adolescents in the cafeteria example above are likely to interpret the boy bumping them in the cafeteria line as purposeful and malicious, access few possible responses, and then engage in reactive aggression such as shoving the boy. ICP youths' hostile attribution biases and negative arousal are related to deficits in interpreting social cues and accessing possible responses, which are the early stages of SIP.

Compared to ICP adolescents, CU adolescents exhibit fewer early stage SIP deficits such as interpreting social cues (Pham, Venderstikken, Philippot, & Venderlinden, 2003) and they are much less likely than ICP adolescents to exhibit hostile attribution biases (Frick et al, 2003; Pardini et al, 2003). CU adolescents may be more likely to interpret the boy bumping into them in the cafeteria line as accidental, not malicious. Because CU adolescents do not experience negative arousal in response to a social interaction such as a bump in the cafeteria line, they are also less likely than ICP adolescents to exhibit a narrowing of accessed responses (Huesmann, 1998; Pham et al, 2003). Past evidence suggests that CU traits may be related to deficits in later stages of

SIP, including the evaluation of consequences. In particular, CU adolescents' responsiveness to rewards but not punishments is evident in their socio-cognitive pattern of positive outcome expectancies for antisocial behavior. That is, youth high in CU traits tend to expect that antisocial behavior will result in a positive outcome (Dodge et al, 1997; Pardini et al, 2003).

In contrast to reactively aggressive patterns of ICP youths, positive outcome expectancies are related to antisocial behavior in the form of proactive aggression (Dodge et al, 1997). Proactive aggression is aggression for dominance or gain, such as verbally or physically threatening a peer in order to gain possession of a tangible reward such as money. CU adolescents likely also engage in some reactive aggression, but apparently without the degree and intensity of angry reactivity ICP adolescents exhibit.

Subgroups of antisocial adolescents exhibit different deficits in SIP stages and different antisocial behavior outcomes. One factor that seems to influence whether antisocial adolescents exhibit deficits in early or later stages of SIP, and thus reactive or proactive aggression is responsiveness to others' distress. It is clear that CU and ICP youths exhibit differences in emotional processes such as negative arousal in response to others' distress (e.g. Pardini et al, 2003). Moreover, past research has indicated that boys and girls also differ in their emotional processing deficits (e.g. Davis & Franzoi, 1991). However, one of the limitations of the SIP model is that it is a "cold model;" that is, it leaves out many of the emotional processes involved in socio-cognitive processing, such as personal distress (Lemerise & Arsenio, 2000).



Research on the influence of emotional processes on social behavior has focused on two primary lines of study: emotionality or emotion regulation (e.g. Eisenberg, Cumberland, Spinrad, Fabes, Shepard, Reiser, et al, 2001; Spinrad, Eisenberg, Cumberland, Fabes, Valiente, Shepard, Reiser et al, 2006) and empathy (e.g. Jolliffe & Farrington, 2004; Miller & Eisenberg, 1988). Emotion regulation is the ability to control one's own internal states to respond in socially appropriate ways to a range of situations (Eisenberg et al, 2001). In contrast to emotion regulation, empathy includes both other-oriented and self-oriented processes. Empathy includes both the cognitive ability to comprehend the emotions of another person and also the affective ability to experience that person's emotions (Davis, 1980; Jolliffe & Farrington, 2006). The different domains of empathy capture a broad range of emotional processes relevant to antisocial youths (Ellis, 1982; Miller & Eisenberg, 1988), which is likely the reason empathy is commonly used to measure the emotional processes of antisocial youths (e.g. Broidy et al, 2003; Jolliffe & Farrington, 2004; Richardson et al, 1994; Shechtman, 2002).

Although researchers acknowledge that both socio-cognitive processing and components of empathy are important predictors of youths' behaviors (e.g. Frick & Morris, 2004; Kaukiainen, Bjorkqvist, Lagerspetz, Osterman, Salmivalli, Rothberg et al, 1999; Miller & Eisenberg, 1988; Richardson et al, 1994), there has been little integration between the research on the two constructs (Lemerise & Arsenio, 2000). Integrating the emotional process of empathy into the conceptual model of SIP could provide a more complete understanding of the factors that organize and motivate antisocial behavior.

## Antisocial Behavior and Empathy

Previous studies have consistently indicated that children and adolescents exhibiting lower levels of empathy exhibit higher levels of antisocial behavior (e.g. Broidy et al, 2003; Cohen & Strayer, 1996; Ellis, 1982; Jolliffe & Farrington, 2004; Richardson et al, 1994; Strayer & Roberts, 2004). Researchers have suggested that empathy influences antisocial behavior by influencing socio-cognitive processing (Bjorkvist et al, 2000; Kaukiainen et al, 1999; Lemerise & Arsenio, 2000). Empathy seems to influence what children pay attention to in social interactions and therefore may organize and motivate many of the steps of SIP, including the early stage of interpreting social cues and the later stage of choosing behavioral responses (Lemerise & Arsenio, 2000). Moreover, many interventions seeking to decrease children and adolescents' antisocial behavior do so by working to increase empathy (Boxer & Dubow, 2002; Lochman et al, 2003; Novaco, 1977; Reddy & Goldstein, 2001; Webster-Stratton & Reid, 2003). However, no studies have explored the mechanism by which empathy is related to SIP and antisocial behavior for adolescents. This study represents an initial attempt to tease apart the components of empathy in order to examine similarities and differences in patterns of empathy for CU and ICP adolescents, as well as to examine gender differences.

Empathy is a complex and nuanced construct; collapsing the different components into one measure appears to obscure the relationships among the domains of empathy and between empathy and other constructs (Davis, 1983). For example, studies that use a single construct of empathy have found small or non-statistically significant correlations

between empathy and antisocial behavior (e.g. Fernandez & Marshall, 2003; Miller & Eisenberg, 1988). Even studies that have collapsed the different domains of empathy measured by such instruments as the Interpersonal Reactivity Index (IRI; Davis, 1991) into the broader categories of affective and cognitive empathy have reported unclear results (e.g. Lovett & Sheffield, 2007). These unclear results have led some researchers to conclude that empathy may not be a significant predictor of antisocial behavior (Bush, Mullis, & Mullis, 2000; Goldstein & Higgins-D'Alessandro, 2001). For example, although some studies have found that only the domain of affective empathy is negatively related to antisocial behavior (Bush et al, 2000; Sheckman, 2003), other studies have found that only the domain of cognitive empathy is negatively related to antisocial behavior (Kroner & Forth, 1995; Jolliffe & Farrington, 2004). Still others have found that the domain of affective empathy is positively related to antisocial behavior (Goldstein & Higgins-D'Alessandro, 2001).

One possible explanation for these mixed or unclear results is that many studies have conceptualized and examined empathy as a single construct or two broad domains consisting of cognitive and affective components instead of examining empathy domains separately (e.g. Cohen & Strayer, 1996). An additional possibility is that past studies have not examined differences in empathy between subtypes of antisocial adolescents or by gender. For example, it is likely that CU adolescents will exhibit lower levels of personal distress than non-antisocial adolescents whereas ICP adolescents are likely to exhibit higher levels of personal distress than non-antisocial adolescents (Frick & Ellis, 1999; Stickle & Frick, 2002). Grouping CU and ICP adolescents together may obscure

the relationship between personal distress and antisocial behavior. Additionally, girls generally exhibit higher levels of all domains of empathy than boys (e.g. Davis & Franzoi, 1991). Consequently, failing to analyze adolescents separately by gender may obscure differences in patterns of empathy of girls and boys, or in relationships among empathy, SIP, and antisocial behavior. Accordingly, the present study utilized the Interpersonal Reactivity Index (IRI) to analyze different domains of empathy for CU and ICP adolescents and for girls and boys separately.

The IRI measures four different domains of empathy: perspective-taking, empathic concern, personal distress, and fantasy (Davis, 1983; Davis & Franzoi, 1991). Perspective taking is the cognitive ability to think about other people's experiences in order to understand their internal states and points of view. Empathic concern is the affective reaction of sympathy and compassion for another person. Past studies have shown that antisocial youths, regardless of CU subtype or gender, exhibit deficits in the cognitive domains, including perspective taking and empathic concern (Beven, O'Brien-Malone, & Hall, 2004; Davis and Franzoi, 1991; Jolliffe & Farrington, 2004; Litvack-Miller, McDougall, & Romney, 1997; Richardson et al, 1994). A third empathy domain, personal distress, is an affective reaction including personal feelings of negative arousal in response to another person's distress. Although perspective taking and empathic concern are negatively related to antisocial behavior, the relationship between personal distress and antisocial behavior is less clear (Alterman, McDermott, Cacciola, & Rutherford, 2003; Beven et al, 2004; Cliffordson, 2001; Curwen, 2003; Davis & Franzoi, 1991; Litvack-Miller et al, 1997). The fourth domain, fantasy, is the cognitive ability to

think about the point of view of fictional characters. Fantasy has been excluded from many studies that use the IRI (e.g. Alterman et al, 2003; Curwen, 2003; Pardini et al, 2003; Richardson et al, 1994). When fantasy has been included in studies, it has not been highly related to dependent measures such as prosocial behavior (e.g. Litvack-Miller et al, 1997) or aggression (e.g. Beven et al, 2004).

The relationship between the empathy domains of the IRI and antisocial behavior may be influenced by CU traits and gender. Overall, empathy and antisocial behavior are negatively related; antisocial adolescents exhibit lower levels of perspective taking and empathic concern than non-antisocial adolescents. However, past studies indicate considerable individual differences among antisocial adolescents in patterns of personal distress. Personal distress shows promise as the empathy domain that may differentiate antisocial adolescents by CU traits and gender. The negative arousal of antisocial adolescents has been studied previously by examining their levels of anxiety (Loney et al, 2003; Muris et al, 2003), but the construct of personal distress captures negative arousal more precisely. Personal distress includes not only some aspects of anxiety but also other emotions such as uneasiness, fear, and anger that are related specifically to antisocial behavior (Davis & Franzoi, 1991).

Moderate levels of negative arousal or personal distress are necessary to inhibit aggression (Miller & Eisenberg, 1988; Richardson et al, 1994). However, ICP adolescents' personal distress is at very high levels and CU adolescents' personal distress is at very low levels compared to non-antisocial adolescents (Frick & Morris, 2004; Loney et al, 2003; Pardini et al, 2003). High levels of personal distress are related to

higher levels of hostility (Curwen, 2003), hostile attribution biases (Huesmann, 1998), and impaired inhibition of aggression (Batson, Early, & Salvarani, 1997; Dodge et al, 1997). High personal distress is evident in reactive aggression, which can be described as a “hot-blooded” form of antisocial behavior. “Hot-blooded” antisocial behavior includes emotionally charged, reactive antisocial acts against people the adolescent knows.

In contrast, low personal distress, a characteristic of CU adolescents, is more often related to proactive, “cold-blooded” antisocial behavior. The antisocial behavior of youths low on negative arousal or personal distress is “cold blooded” because the antisocial acts are not typically emotionally charged and may involve strangers as easily as people the adolescent knows (Dodge et al, 1997). CU youths have the ability to cognitively differentiate positive and negative emotions and to exhibit some appropriate emotional responses (Blair, Colledge, Murray, & Mitchell, 2001; Loney et al, 2003). However, CU youths exhibit impaired responsiveness and personal distress in response to others’ distress in fearful or sad situations (Blair et al, 2001; Blair, Mitchell, Richell, Kelly, Leonard, Newman, & Scott, 2002; Loney et al, 2003, Pardini et al, 2003), consistent with adults with psychopathic traits (Blair, 1999). Although both CU and ICP youths exhibit deficits in perspective taking and empathic concern compared with non-antisocial youth, CU youths exhibit greater deficits in empathy than both other antisocial and non-antisocial youths (Ellis, 1982; Pardini et al, 2003).

Previous research has also shown gender differences in empathy. Females consistently score higher than males on measures of empathy at all ages, from elementary school through adulthood (Bush et al, 2000; Cohen & Strayer, 1996; Davis & Franzoi,

1991; Eisenberg, Cumberland, Guthrie, Murphy, & Shepard, 2005; Hatcher, Nadeau, Walsh, Reynolds, Galea, & Marz, 1994; Henry, Sager, & Plunkett, 1996; Karniol, Gabay, Ochion, & Harari, 1998; Kochanska, 1997; Pardini et al, 2003). Additionally, the relationship between empathy and antisocial behavior may be different for females than for males, although there is very limited research on gender differences on the different domains of empathy. One study that focused on subjects at high and low risk of aggressive behavior found that high-risk females exhibited higher levels of personal distress than high-risk or low-risk males (Perez-Albeniz & de Paul, 2004).

Taken together, the evidence indicates that antisocial adolescents generally exhibit deficits in empathy and in SIP, and high levels of antisocial behavior. However, there appear to be important differences in the pattern of these deficits in empathy and SIP between girls and boys, and between individuals within subtypes of antisocial adolescents.

## Hypotheses

Although empathy and SIP have been studied individually as predictors of antisocial behavior, the relationship among these constructs has yet to be investigated in a single study. The current study investigates the relationships among empathy, SIP, CU traits, and antisocial behavior for a sample of girls and boys with high rates of antisocial behavior. In order to explore the mechanism by which empathy influences SIP and antisocial behavior, three research questions were posed. First, does SIP mediate the

relationship between empathy and antisocial behavior? Second, do CU traits moderate the relationship between empathy, SIP, and antisocial behavior? Third, do these findings differ for girls and boys?

To address these questions, there were four hypotheses for the current study. The first hypothesis is that *girls will have higher levels of empathy than boys on all of the empathy domains*.

The second hypothesis is that *SIP will mediate the relationship between empathy and antisocial behavior*, such that deficits in empathy will be associated with deficits in SIP and increased antisocial behavior. Specifically, higher levels of personal distress will be related to deficits in the early stages of SIP (higher hostile attribution bias and fewer possible responses) and increased antisocial behavior. Lower levels of empathic concern and perspective taking will be related to deficits in the later stages of SIP (higher expectation of tangible rewards and lower expectation of punishment) and to increased antisocial behavior.

The third hypothesis is that *CU traits will moderate the mediation*, such that CU traits will be associated with different patterns of empathy, SIP, and antisocial behavior (see Figure 1). Specifically, higher levels of CU traits will be associated with lower levels in all domains of empathy, deficits in the later stages of SIP, and higher levels of antisocial behavior, whereas lower levels of CU traits will be associated with lower levels of perspective-taking and empathic concern but higher levels of personal distress, deficits in the early stages of SIP, and lower levels of antisocial behavior. In addition, it is



predicted that lower levels of CU traits will be associated with reactive aggression and higher levels of CU traits will be associated with both proactive and reactive aggression.

The fourth hypothesis is that, although empathy, prior beliefs about aggression, and CU traits will be moderately correlated, *empathy will predict unique variance in SIP and antisocial behavior above and beyond the variance predicted by aggression beliefs and CU traits.*

Lastly, this study explored differences in demographics, SIP stages, CU traits, and antisocial behavior between girls and boys. Previous studies have found different patterns of antisocial behavior by gender, including higher rates of antisocial behavior for boys and a later age of onset of antisocial behavior for girls. However, studies of antisocial children and adolescents have focused almost exclusively on boys and there has been little research on gender differences in SIP or CU traits in adolescence. This study examined how empathy, SIP, and antisocial behavior differed for adjudicated adolescents depending on the presence of CU traits and gender.

## Methods

### Participants

Participants were 150 adjudicated or pre-adjudicated adolescents (Mean age = 15.21 years, SD = 1.40 years, range = 11-17 years). All participants were in the Vermont juvenile justice system at one of two detention centers. Woodside Juvenile Rehabilitation Center (Woodside) is a co-ed facility in Colchester, Vermont. Spectrum Youth and Family Services Sand Hill Residential Program for Young Women (Sand Hill) is an all

female facility in Castleton, Vermont. All of the youths who resided at either detention center for at least two weeks, had signed guardian consent, and did not meet exclusion criteria were invited to participate. The exclusion criteria included the following: intellectual impairment which limited the subject's ability to complete measures validly, diagnosis of Pervasive Developmental Disorder, Mental Retardation, Selective Mutism, Organic Mental Disorders, Schizophrenia, Other Psychotic Disorders, or the inability to give informed, written assent. Five subjects met exclusion criteria due to either cognitive deficits or deficits in reading ability which resulted in their inability to complete measures validly. Five subjects declined to participate. Five subjects were excluded due to incomplete data. They either did not complete the Youth Self Report (YSR; Achenbach, 1991b) when admitted to the detention center or were discharged from the detention center before completing the second part of the interview. The final sample of 150 participating youths was 60% male, 85% Caucasian, 3% African American, 5% Hispanic, and 6% other ethnicity (including Asian and Native American). The percentages of participants in different ethnic groups do not add up to 100% due to rounding.

#### Procedure

Consent was first obtained from the youths' caseworkers because all youth in these centers were in state custody. Once consent was obtained for eligible youth, they were invited to participate in the study. Following an overview of the study and procedures, youths completed assent forms. To assure that participation was completely voluntary in this vulnerable population, a representative from the Juvenile Defender's

office was available on site or by phone so that youths could ask questions of a neutral party (rather than research staff or detention staff).

Trained research assistants administered measures orally to individual youths in a two-part interview with each part lasting between 30 minutes and 1 hour. At the beginning of each part of the interview and between each measure, research assistants read the standardized instructions to the participant. During the first half of the interview, research assistants read measure items aloud and youths verbally chose responses from printed cards. Each uniquely colored card contained the Likert scale response options for one measure, such as the Interpersonal Reactivity Index (IRI; Davis, 1983). The cards also listed word anchors for the numerical response options.

After a short break or on the following day, youths completed the second half of the interview. Research assistants read measure items aloud and youths verbally chose from among responses printed on 8.5 x 11 paper in a 3-ring binder. As in the first half of the interview, each measure had its own set of response options on separate pages. These responses included several Likert scales for measures such as the Outcome Expectancy Question (OEQ; Perry, Perry, and Rasmussen, 1986). The youths also completed one written self-report measure, the Youth Self Report (YSR; Achenbach, 1991b), upon being admitted to the detention center. Teachers and detention center staff completed written questionnaires at the detention centers. Modest incentives were provided for participation. Each youth received a \$10 gift certificate to a local shopping mall or fast food establishment plus a small prize of their choosing (e.g. a small bottle of lotion or deck of cards) worth about \$1 upon completion of the second interview. A drawing for

prizes for teachers and staff was held after every 25 participant protocols were completed. Each teacher and staff person received a single entry in the drawing for each completed protocol. Prizes valued at \$25-\$50 were awarded at each of these drawings.

## Measures

### *Demographics*

Youths reported their gender, age, age of onset of antisocial behavior, age of first arrest, and ethnicity (see Tables 1 and 2).

### *Empathy*

The Interpersonal Reactivity Index (IRI; Davis, 1983) is designed to measure cognitive and affective domains of empathy. Teachers, staff, and youths completed 28 items on a 5-point scale (“does not describe me well” to “describes me very well”) with subscales for perspective-taking (e.g., “I sometimes try to understand my friends better by imagining how things look from their perspective”), empathic concern (e.g., “I often have tender, concerned feelings for people less fortunate than me”), personal distress (e.g., “Being in a tense emotional situation scares me”), and fantasy (e.g., “When I watch a good movie, I can very easily put myself in the place of a leading character”). The IRI has acceptable internal consistency ( $\alpha = .70-.78$ ), test-retest reliability (.58-.65), and evidence of predictive and convergent validity (Davis, 1983; Davis & Franzoi, 1991). Reliability coefficients reported from previous studies are consistent with those for the current sample (perspective taking  $\alpha = .71$ , empathic concern  $\alpha = .69$ , personal distress  $\alpha = .67$ , fantasy  $\alpha = .69$ ).

### *Social Information Processing*

The Attribution and Response to Ambiguous Provocation Scale (ARAPS; adapted from Dodge, 1980 and Crick, 1995) uses twelve hypothetical situations to assess attribution of intent, accessing aggressive responses, and choosing aggressive responses. The hypothetical situations were taken from previous adaptations of Dodge's original instrument and adapted to be both age-appropriate (e.g. "lunchroom" instead of "playground") and relevant (e.g. "CD player" instead of "radio") for adolescents. Youths interpreted hypothetical social situations in which provocation occurred but the intentions of the other (provoking) youth were ambiguous. Following a description of a situation and a question about the intent of the peer, youths chose from four possible peer intentions (e.g. "Why did the girl break your CD player?" "She didn't realize it could break so easily," "She was jealous of me," "It was an accident," or "She was mad at me") which assessed their hostile attribution bias ( $\alpha = .67$ ). Given a list of six aggressive, prosocial, or avoidant responses, youths chose possible responses they might enact for each situation on a three-point scale ("no", "maybe", "yes"). The total number of aggressive responses youths chose as possibilities was called access of aggressive responses ( $\alpha = .93$ ). Youths also chose the one response they were most likely to enact for each situation. The total number of aggressive responses youths identified as the behavior they were most likely to enact was called aggressive response choices ( $\alpha = .81$ ). The variable of aggressive response choices was the self-reported antisocial behavior outcome measure (not a SIP measure).

The Outcome Expectancy Questionnaire (OEQ; Perry, Perry, & Rasmussen, 1986) uses a four-point scale ("very sure would not" to "very sure would") to assess

youths' expectations of outcomes following an aggressive act. Eight vignettes asked youths to imagine using aggressive behavior to retaliate against a peer or to obtain tangible rewards such as social dominance or gaining something of value ("You're thinking about telling the teen you will get him later if he doesn't give you the cookies. If you did threaten him, do you think you would get the cookies?"). Expectation of tangible rewards and reduction of aversive treatment have been shown to reliably differentiate aggressive from non-aggressive youths (Hall, Herzberger, & Skowronski, 1998; Perry et al, 1986). However, the subscales have variable internal consistency ( $\alpha = .56-.91$ ; Hall et al, 1998; Pardini et al, 2003). The measure was included in the present study because it is a widely used measure of youths' outcome expectancies and has good internal consistency for nearly all of the subscales in studies of adjudicated youths (Pardini et al, 2003; Smithmyer, Hubbard & Simons, 2000). For the current sample, internal consistency was good for expectation of punishment ( $\alpha = .80$ ) and fair for both expectation of tangible rewards ( $\alpha = .66$ ) and reduction of aversive treatment ( $\alpha = .59$ ).

#### *Callous-Unemotional Traits*

The Inventory of Callous and Unemotional Traits (ICU; Frick, 2004) is an expansion of the CU scale of the Antisocial Process Screening Device (APSD; Frick & Hare, 2001). The APSD is a measure of psychopathic traits that is widely used for children and adolescents. The callous/unemotional factor and impulsivity/conduct problems factor of the APSD have been shown to have good internal consistency (Frick, Bodin, & Barry, 2000), and to reliably differentiate between subtypes of adolescent offenders (Caputo, Frick, & Brodsky, 1999; Silverthorn et al, 2001). The ICU is intended

to add sensitivity to the assessment of CU traits with self-report and teacher/staff versions (Frick, 2004). The ICU expands each item on the callous/unemotional scale of the APSD into two positive and two negative items. Teachers, staff, and youths completed 24 items such as “I am very expressive and emotional” and “The feelings of others are unimportant to me” on a 4-point scale (“not at all true” to “definitely true”). The internal consistency of the total ICU score for the current sample (youth  $\alpha = .74$ , staff  $\alpha = .77$ , teacher  $\alpha = .86$ ) is consistent with a previous analysis of the callousness scale of the ICU ( $\alpha = .70$ , Essau, Sasagawa, & Frick, 2006).

#### *Antisocial Behavior Outcomes*

Youths filled out the Youth Self-Report (YSR; Achenbach, 1991b) upon arrival at the detention center and teachers and staff filled out the Teacher Report Form (TRF; Achenbach, 1991a). These 118-item checklists include numerous scales, including two scales that measure antisocial behavior: aggressive behavior and delinquent behavior. Reliability is good for these instruments, with average test-retest reliability coefficients reported for the aggressive behavior and delinquent behavior scales of .91 and .86, respectively (Achenbach, 1991a; Achenbach, 1991b). Internal consistency in the current sample was good for all reporters for both the aggressive behavior scale (youth  $\alpha = .87$ , staff  $\alpha = .96$ , teacher  $\alpha = .92$ ) and the delinquent behavior scale (youth  $\alpha = .74$ , staff  $\alpha = .81$ , teacher  $\alpha = .78$ ).

The adapted version of the Proactive/Reactive Aggression Rating Scale (adapted from Dodge & Coie, 1987) includes 6 items. Teachers and staff used a 5-point scale (“never” to “always”) to respond to three items about proactive aggression (e.g., “This

youth threatens or bullies to get his/her own way”) and three items about reactive aggression (e.g., “When this youth has been teased or threatened, he/she gets angry easily and fights back”). The Proactive/Reactive Aggression Rating Scale has been found to have good internal consistency (proactive aggression  $\alpha = .92$ , reactive aggression  $\alpha = .95$ , Waschbusch, Willoughby, & Pelham, 1998). For the current sample, internal consistency was good for proactive aggression (staff  $\alpha = .89$ , teacher  $\alpha = .86$ ) and reactive aggression (staff  $\alpha = .89$ , teacher  $\alpha = .88$ ).

#### *Prior Beliefs About Aggression*

The Normative Beliefs about Aggression Scale (NOBAGS; Huesmann & Guerra, 1997) assesses beliefs about the acceptability of aggressive responses. Youths responded to 20 items on a 4-point scale (“really wrong” to “perfectly ok”). Eight items address general beliefs about aggression (“It is usually ok to push or shove other people around if you’re mad”) and twelve items address the acceptability of aggression under conditional circumstances (“Suppose a boy hits another boy, John. Do you think it’s wrong for John to hit him back?”). The NOBAGS has been shown to have good internal consistency ( $\alpha = .90$  for total scale), test-retest reliability, and convergent validity (Huesman & Guerra, 1997). For the current sample, internal consistency for the total score was good ( $\alpha = .93$ ).

#### *Multiple Informant Data*

This study uses adult and youth reports of youths’ behavior. Previous literature has shown poor agreement between adolescents and adults on behavioral reports. One seminal meta-analysis found that agreement between multiple informants of children or adolescents’ behavior averages 0.27 (Achenbach, McConaughy, & Howell, 1987). This



poor agreement has been found with adjudicated youths as well (Forehand, Frame, Wierson, Armistead, & Kempton, 1991). Although studies have consistently found that children underreport disruptive behaviors (e.g. Loeber, Green, Lahey, & Stouthamer-Loeber, 1991), studies of informant agreement regarding adolescent behavior have been mixed. Some studies have found that adolescents report more aggressive and delinquent behaviors than parents or teachers (Youngstrom, Loeber, & Stouthamer-Loeber, 2000) and other studies have reported mixed results (Forehand et al, 1991). Self-report measures from adolescents are important for assessing their own behavior, as adults may be unaware of adolescents' activities outside of home and school.

Methodologists argue that the preferred method of combining symptoms across multiple informants is to consider symptoms present if endorsed by any informant (Piancentini, Cohen, & Cohen, 1992). Additionally, this method is recommended in the published manual for the APSD, and by extension, the ICU. Thus, in order to take into account youths' reports of their own behaviors and also anticipate possible underreporting of antisocial behavior by youths, the highest value reported for youth antisocial behavior by any informant was used instead of the mean of the multiple informants. The multiple informant measures were the measures of CU traits (ICU) and aggressive and delinquent behavior (YSR and TRF), which were completed by staff, teachers, and youths, and the measure of proactive and reactive aggression (Proactive/Reactive Aggression Rating Scale), which was completed by staff and teachers. Subsequent analyses refer to the "highest rater" data for these measures.

## Preliminary Analyses

### Data Cleaning and Screening

All youths participated in both parts of the interview and staff and teachers reported data on all youths. However, there was a small amount of data missing due to either an informant skipping an item or research assistant error in recording informant answers. In addition, one measure, the Proactive-Reactive Aggression Rating Scale, was added after data collection began and thus was missing some values. Examination of the missing data revealed that it was missing at random (MAR); missing values on variables were not related to the values of other variables. Following the recommendations of Figueredo, McKnight, McKnight, and Sidani (2000), Rubin (1987), and Little and Rubin (1989), missing data were handled using multiple imputation. Multiple imputation operates on the assumption that data are missing completely at random (MCAR) or missing at random (MAR), as do other methods of handling missing data such as casewise deletion. Data are MAR if the likelihood of a value missing is unrelated to the variable itself or to other variables. Multiple imputation predicts missing values based on the distributions of existing values. Imputing the predicted values for the missing values multiple times results in several full data sets. Differences between these multiple imputed data sets are analyzed and the analyses are combined into one data set. These full information “imputed” data sets maintain the variability of the data and incorporate appropriate uncertainty about what the missing values would have been (Schafer, 1997).

The distributions of several variables violated assumptions of normality: perspective taking from the IRI and access of aggressive responses and aggressive

response choices from the ARAPS. Because regression analyses are sensitive to violations of normality, these variables were transformed to decrease their skew and kurtosis. Square root transformations reduced the skew and kurtosis of perspective taking, access of aggressive responses, and aggressive response choices, but did not significantly affect any of the relationships between variables. Subsequent regression analyses use the transformed versions of perspective taking, access of aggressive responses, and aggressive response choices.

### Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was used to test the four-factor structure of empathy as measured by the IRI, derived from Davis' (1980) multidimensional approach. The IRI as developed comprises four latent factors: perspective taking, empathic concern, personal distress, and fantasy (Davis, 1980; Davis 1983; Davis & Franzoi, 1991). Previous studies have found that the strongest components of the IRI are the perspective taking and empathic concern factors. Personal distress and fantasy appear to be less clearly related to overall empathy (Alterman et al, 2003; Cliffordson, 2001; Cliffordson, 2002). In CFA, a good fit of the model to the data is indicated by a nonsignificant chi square ( $\chi^2$ ), comparative fit index (CFI) of 0.90 or greater, and root mean squared error of approximation (RMSEA) of 0.08 or below.

When analyzed separately, the fit indices on the IRI for girls and boys followed the same patterns. Thus, confirmatory factor analysis results are presented below for girls and boys analyzed together. In the present study, the fit indices for the four-factor model

for both girls and boys indicated that the model is a reasonable approximation to the data, if less than ideal,  $\chi^2 = 533.72$  (344),  $p < .001$ , CFI = 0.78, RMSEA = 0.06, 90% CI 0.05 - 0.07. These findings provide weak support for Davis' (1980) construct of empathy as consisting of four factors. A three-factor model that included perspective taking, empathic concern, and personal distress was a somewhat better fit for both girls and boys,  $\chi^2 = 282.76$  (186),  $p < .001$ , CFI = 0.83, RMSEA = 0.06, 90% CI 0.05 - 0.07. A two-factor model that included perspective taking and empathic concern was a good fit for both girls and boys  $\chi^2 = 100.77$  (76),  $p < .05$ , CFI = 0.92, RMSEA = 0.05, 90% CI 0.02 - 0.07. In addition, another two-factor model that included perspective taking and personal distress fit the data reasonably well, although not ideally,  $\chi^2 = 115.19$  (76),  $p < .01$ , CFI = 0.88, RMSEA = 0.06, 90% CI 0.04 - 0.08. Consistent with previous studies, the factor of fantasy was not related to the other three factors.

Although personal distress was not an ideal fit to the data, it was part of three-factor and two-factor models that had good fit to the data. This suggests that it is a unique and integral domain of empathy. Therefore, analyses were based on a three-factor model of perspective taking, empathic concern, and personal distress.

### Group Differences and Hypothesis 1

Preliminary analyses assessed differences between youths based on gender, ethnicity, and age for all study variables. Table 3 displays the means and standard deviations of the sample's empathy scores compared to the means of a normative high school sample in a study by the author of the IRI (Davis & Franzoi, 1991). Standard

deviations for the normative sample were not available. Compared to this normative sample of high school students in the 10<sup>th</sup> grade, the adjudicated youths reported lower levels of all four empathy factors, with the exception of personal distress for girls. The adjudicated girls reported higher rates of personal distress than the girls in the normative 10<sup>th</sup> grade sample. The empathy scores of the adjudicated youths in the current study were consistent with previous studies of adjudicated boys alone (e.g. Lindsey, Carlozzi, & Eells, 2001; Moriarty, Stough, Tidmarsh, Eger, & Dennison, 2001) and of adjudicated girls and boys (Bush et al, 2000).

A general linear model (GLM) was used to test hypothesis 1, that girls have higher levels of empathy than boys, and to explore gender differences in demographics, SIP stages, CU traits, and antisocial behavior. Girls and boys did not differ significantly on age at the time of the interview or age of first arrest. However, girls began exhibiting problem behaviors later than boys ( $F(1, 148) = 16.96, p < .001$ , see Table 1). As expected, girls had higher levels of empathy as measured by personal distress ( $F(1, 149) = 46.17, p < .0001$ ) and empathic concern ( $F(1, 149) = 14.92, p < .001$ , see Table 3). The means and standard deviations of SIP, antisocial behavior, and CU trait variables are displayed in Table 4. In terms of SIP and antisocial behavior, girls reported higher levels of hostile attribution bias ( $F(1, 149) = 4.66, p < .05$ ), a higher level of access of aggressive responses ( $F(1, 149) = 5.72, p < .05$ ), and a greater number of aggressive response choices than boys ( $F(1, 149) = 4.17, p < .05$ ). Surprisingly, there were no gender differences on aggressive or delinquent behaviors as measured by the highest rater. As expected, boys

had higher levels of total CU traits than girls, as measured by the highest rater ( $F(1, 149) = 9.37, p < .01$ ).

There seemed to be differences between youths based on ethnicity. However, valid statistical analysis between groups was not possible due to the small size of the non-Caucasian ethnic groups. For example, there were only four Hispanic girls and four Hispanic boys (see Table 2). With such a small  $n$ , differences between groups are statistically unreliable due to the large standard errors of the estimates.

Tables 5-10 report the Pearson correlations for all study variables for males and females separately. As expected, perspective taking and empathic concern were highly positively associated for both girls and boys. For girls only, fantasy was also significantly positively associated with perspective taking and empathic concern, and perspective taking was negatively related to personal distress. Perspective taking was negatively associated with the SIP stages of hostile attribution bias and access of aggressive responses for both girls and boys. Personal distress was positively associated with hostile attribution bias and access of aggressive responses for girls. Empathic concern and personal distress were both positively associated with expectations of punishment and negatively associated with expectations of tangible rewards for both girls and boys.

Examining the relationship between empathy and antisocial behavior, perspective taking and empathic concern were negatively related to antisocial behavior for both girls and boys. Personal distress was positively related to antisocial behavior for girls only. One of the antisocial behavior outcomes, self-reported aggressive response choices, included six different categories of responses: four aggressive (relational, verbal, covert,

and physical aggression) and two non-aggressive (problem-solving and withdrawal, see Table 11 for means and standard deviations). These six possible response choices had different patterns of relationships with the empathy subscales (see Tables 12 and 13). Higher levels of perspective taking and empathic concern were related to a greater number of problem-solving choices and less physical aggression for both girls and boys. Higher levels of personal distress were related to less problem-solving choices and more covert aggression for girls only. Higher levels of empathic concern were related to less covert aggression for boys only. Because there were no significant gender differences between the levels of the six categories of aggressive response choices, subsequent analyses include the total aggressive response choices.

Age was significantly correlated with several SIP and antisocial behavior variables. As described above, there was a trend toward differences between ethnic groups. However, ethnic group size was too small to conduct meaningful statistical comparisons. Ethnicity and age were therefore entered as covariates in subsequent analyses.

## Results

### Hypothesis 2

A series of hierarchical multiple regressions was performed to test Hypothesis 2, that SIP mediates the relationship between empathy and antisocial behavior. Only those variables significantly correlated with antisocial behavior were entered into subsequent regression analyses (see Tables 5-10 for correlations). Consistent with previous research on empathy and SIP, the four empathy domains were significantly correlated with one

another, as were many of the SIP stages. In order to minimize the effects of multicollinearity, all of the empathy and SIP variables were centered prior to regression analyses. Reduction of aversive treatment was not significantly correlated with any of the antisocial behavior outcomes and was dropped from subsequent analyses. The four empathy domains of the IRI had different correlations with the stages of SIP and therefore the empathy domains were examined as separate predictors in subsequent analyses.

Means and standard deviations of the study variables and correlations between study variables differed for girls and boys, as described in the preliminary analyses. Therefore, the following mediation models were tested separately for girls and boys, as well as together for all youths with gender as a moderator.

Predictor variables were entered in four steps. Youth age at time of interview and youth ethnicity were entered in step 1. Empathy domains (perspective taking, empathic concern, personal distress, and fantasy) were entered in step 2. SIP stages (hostile attribution bias, expectation of tangible rewards, expectation of punishment, and access of aggressive responses) were entered in step 3. Significant mediation models were also tested with CU traits entered as a covariate in step 1. As outlined by Baron and Kenny (1986), four conditions have to be met to establish potential mediation. First, empathy must predict variance in SIP, controlling for the demographic variables of age and ethnicity. Next, empathy must predict variance in antisocial behavior, controlling for the demographic variables. Third, SIP must predict variance in antisocial behavior, controlling for the demographic variables. Lastly, to demonstrate full mediation, the



relationship between empathy and antisocial behavior must be reduced to nonsignificance when SIP is entered into the equation.

The four conditions of mediation outlined above provide one indication of potential mediation, but this approach cannot test whether the complete indirect effect is significant. Therefore, a product of coefficients strategy, also known as the Sobel test (Sobel, 1982), was performed to test whether the complete indirect pathway from the predictor through the mediator to the dependent variable was significant. Regression analyses included both self-reported and highest-rater antisocial behavior measures. Significant indirect effects (Sobel tests) for the mediational analyses are reported as a  $z$  statistic.

In the regression tables (Tables 14-27), only the final stage of each hierarchical multiple regression is presented. In each table,  $\beta$  in the first column represents the standardized beta coefficients for the indirect path, when the covariates, independent variable, and mediator were all entered. The total effect  $\beta$  in the second column represents the standardized beta coefficients for the direct path from the independent variable to the dependent variable (with the covariates) without the mediator.

#### *Youth Self-Reported Antisocial Behavior*

All of the following regressions were significant after controlling for age, ethnicity, and CU traits except where otherwise noted. For both girls and boys, hostile attribution bias mediated the relationship between perspective taking and aggressive response choices. As expected, higher levels of perspective taking predicted lower hostile attribution bias and fewer aggressive response choices (Table 14,  $z = -3.36$ ,  $p = .0008$ ).

For both girls and boys, access of aggressive responses mediated the relationship between perspective taking and aggressive response choices. Higher levels of perspective taking predicted lower levels of access of aggressive responses and fewer aggressive response choices (Table 15,  $z = -3.11$ ,  $p = .002$ ).

For girls, hostile attribution bias mediated the relationship between personal distress and aggressive response choices. As expected, higher levels of personal distress predicted higher hostile attribution bias and a greater number of aggressive response choices (see Table 16,  $z = 3.24$ ,  $p = .001$ ). For girls, access of aggressive responses also mediated the relationship between personal distress and aggressive response choices. Higher levels of personal distress predicted greater access of aggressive responses and a greater number of aggressive response choices (Table 17,  $z = 2.76$ ,  $p = .006$ ).

In addition to the significant mediation models described above, empathic concern and personal distress were also related to several SIP stages. Expectation of punishment and expectation of tangible rewards partially mediated the relationship between empathic concern and aggressive response choices for both girls and boys, controlling for age and ethnicity (but not CU traits). In both of the models described below, each condition of mediation was met until the last step, where empathic concern remained significant. However, the strength of the relationship between empathic concern and aggressive response choices was reduced when the variance associated with the SIP measures was taken into account. Higher levels of empathic concern predicted higher expectations of punishment and fewer aggressive response choices for both girls and boys (Table 18,  $z = -2.09$ ,  $p < .05$ ). Higher levels of empathic concern predicted lower

expectations of tangible rewards and fewer aggressive response choices for both girls and boys (Table 19,  $z = -1.91$ ,  $p < .07$ ).

Controlling for age, ethnicity, and CU traits, personal distress predicted several SIP stages, although there was no significant mediation. For both girls and boys, higher levels of personal distress predicted higher expectations of punishment (Table 20). For boys, higher levels of personal distress also predicted lower expectations of tangible rewards (Table 21).

In order to conduct a more rigorous test of gender differences, the significant regression models described above were tested with gender as a moderator of the relationship between empathy and SIP and between SIP and antisocial behavior. Gender significantly moderated the relationship between personal distress and hostile attribution bias in a simple moderated mediation model ( $t = -3.26$ ,  $p = .001$ ). For girls, higher levels of personal distress were related to greater hostile attribution bias, whereas for boys there was no relationship. There was also a significant interaction between gender and access of aggressive responses on aggressive response choice ( $t = -2.31$ ,  $p = .02$ ), with a larger effect for girls than for boys.

In order to strengthen the interpretation of mediation and rule out an alternative explanation for the significant effects, a reverse causal effect was tested. The mediation models were tested with the number of aggressive response choices as a SIP mediator and access of aggressive responses as an antisocial behavior outcome. Aggressive response choices were entered as a mediator and access of aggressive responses were entered as an outcome in a series of hierarchical regressions, controlling for age, ethnicity, and CU

traits. Although some of the paths in these reverse causal models were significant, the magnitude of associations was smaller than those in the models that tested the original hypotheses. For example, hostile attribution bias partially mediated the relationship between personal distress and access of aggressive responses for girls only. However, hostile attribution bias fully mediated the relationship between personal distress and aggressive response choices.

#### *Highest-Rater Antisocial Behavior*

Results showed that after controlling for variance associated with age and ethnicity, perspective taking significantly predicted all four highest-rater antisocial behavior measures for both girls and boys: aggressive behavior, delinquent behavior, proactive aggression, and reactive aggression. However, the relationship between perspective taking and several of the highest-rater antisocial behavior outcomes ceased to be significant when controlling for CU traits and prior beliefs about aggression (see Tables 22-26). When controlling for CU traits and prior beliefs about aggression, perspective taking predicted proactive aggression for both girls and boys, and aggressive behavior for girls only. Fantasy significantly predicted aggressive behavior for girls only (Table 27). Empathic concern, personal distress, and the SIP measures did not predict any of the antisocial behavior outcomes other than self-reported aggressive response choices.

### Hypotheses 3

Hypothesis 3 stated that CU traits moderate the mediation in Hypothesis 2. First, general linear models (GLM) were used to test differences between CU groups on all of the study variables. Youths were divided into three groups based on their levels of CU traits. The low CU group had levels of CU traits 1 SD or greater below the mean (see Table 4 for means and standard deviations), the medium CU group had levels of CU traits within 1 SD of the mean, and the high CU group had levels of CU traits 1 SD or greater above the mean (see Tables 28 and 29 for descriptive statistics on the three groups). The high CU group had significantly lower expectations of punishment for antisocial acts than the medium CU group for girls and than both the medium and low CU groups for boys. Girls and boys in the high CU groups exhibited more aggressive behavior, delinquent behavior, and reactive aggression than youths in the medium or low CU groups. Girls in the high CU group also exhibited more proactive aggression than girls in the other two groups. Although girls overall had lower levels of CU traits and antisocial behavior than boys, girls in the high CU group exhibited higher levels of CU traits and antisocial behavior than all other girls and boys.

Moderated mediation was tested using macros by Preacher, Rucker, and Hayes (2007) that test conditional indirect effects. The moderated mediation model tested hypothesized that CU traits moderate the relationship between empathy and SIP (the mediator) and additionally moderates the relationship between SIP and the dependent variable of antisocial behavior. Significant mediation models were tested controlling for age and ethnicity. None of the interactions was significant.

#### Hypothesis 4

Hypothesis 4 stated that empathy predicts unique variance in SIP and antisocial behavior above and beyond the variance predicted by prior beliefs about aggression or CU traits. For Hypothesis 4, a series of hierarchical multiple regressions tested the relationships between empathy and SIP and empathy and antisocial behavior, controlling for prior beliefs about aggression and CU traits. CU traits and prior beliefs about aggression were highly related (boys:  $r = .21, p < .05$ ; girls:  $r = .54, p < .001$ ). Age, ethnicity, and gender were entered in step 1, prior beliefs about aggression in step 2, CU traits in step 3, and empathy in step 4. Personal distress significantly predicted hostile attribution bias, expectation of punishment, and access of aggressive responses for girls after controlling for CU traits and prior beliefs about aggression. Perspective taking significantly predicted hostile attribution bias for boys and access of aggressive responses for girls after controlling for CU traits and prior beliefs about aggression. After controlling for prior beliefs about aggression, CU traits did not predict any of the SIP measures.

In terms of antisocial behavior, prior beliefs about aggression significantly predicted aggressive response choices for both girls and boys (Table 22). Youths who had higher levels of beliefs approving of aggression also had more aggressive response choices. CU traits significantly predicted all of the highest-rater antisocial behavior outcomes (aggressive behavior, delinquent behavior, proactive aggression, and reactive aggression) for both girls and boys after controlling for variance associated with prior beliefs about aggression and perspective taking (Tables 23-26). Perspective taking

significantly predicted variance in proactive aggression for girls and boys and aggressive behavior for girls after controlling for prior beliefs about aggression and CU traits.

## Discussion

The current study extends previous findings on deficits in emotional and social cognitive processes and their relations to increased antisocial behavior. Specifically, deficits in empathy and Social Information Processing (SIP) and high levels of callous-unemotional (CU) traits predicted a range of antisocial behaviors in a sample of adjudicated male and female adolescents. SIP mediated the relationship between empathy and self-reported antisocial behavior for girls and boys. As predicted, findings indicate important differences in patterns of empathy, SIP, CU traits, and antisocial behavior both by gender and by subtype of antisocial behavior: Callous-Unemotional traits (CU) and primarily Impulsive Conduct Problems (ICP). In addition, the results supported several predictions about the domains of empathy.

### Empathy Domains of the IRI

The current results generally supported past research on the IRI with regard to relationships among the domains of empathy, relationships between empathy domains and behavioral outcomes, and gender differences in empathy. Consistent with previous studies, perspective taking was the best predictor of antisocial behavior for girls and boys (e.g. Alterman et al, 2003; Cliffordson, 2001; Richardson et al, 1994). Specifically,

perspective taking was the strongest predictor of SIP and self-reported antisocial behavior and was the only empathy domain that predicted multiple informant ratings of antisocial behavior. A confirmatory factor analysis indicated that a three-factor model including the domains of perspective taking, empathic concern, and personal distress was a good fit to the data for boys and girls. Additionally, all three of those empathy domains significantly predicted both SIP and self-reported antisocial behavior. Although previous studies using the IRI have often left out the domain of personal distress (e.g. Jolliffe & Farrington, 2004; Loudin, Loukas, & Robinson, 2003), the current findings suggest that personal distress is a unique and integral domain of empathy.

There was support for the first hypothesis, that girls would report higher levels of empathy than boys. Previous research on adolescents has consistently found that girls exhibit higher levels of empathy than boys (e.g. Davis & Franzoi, 1991; Henry et al, 1996; Karniol et al, 1998). However, girls' empathy scores were significantly higher than boys' only for the two affective empathy domains: personal distress and empathic concern.

As expected, perspective taking, personal distress, and empathic concern had different relationships with SIP and antisocial behavior. For both girls and boys, higher levels of perspective taking predicted fewer deficits in SIP and lower levels of antisocial behavior. However, there were gender differences on empathic concern and personal distress. Higher levels of empathic concern predicted fewer SIP deficits and lower levels of antisocial behavior for boys, whereas higher levels of personal distress predicted mixed findings with SIP deficits and higher levels of antisocial behavior for girls.



Empathic concern and personal distress both theoretically assess affective constructs, but have very different relationships with SIP and antisocial behavior. Analyzing these two empathy domains as one construct of affective empathy has resulted in contradictory findings in previous studies. Previous studies have found that higher levels of affective empathy predict higher antisocial behavior (Goldstein & Higgins-D'Alessandro, 2001) or lower levels of antisocial behavior (Bush et al, 2000; Shectman, 2003), or that there is no relationship between affective empathy and antisocial behavior (Kroner & Forth, 1995; Jolliffe & Farrington, 2004). Empathic concern and personal distress relate very differently to SIP and antisocial behavior and thus these two affective empathy components should be analyzed separately. Differences between girls and boys should also be tested in order to capture gender differences on empathy, especially on personal distress.

#### SIP as a Mediator

The findings supported the second hypothesis, that SIP mediated the relationship between empathy and antisocial behavior. The relationships among empathy, SIP, and antisocial behavior suggest that decoding and interpreting information about social situations involves emotional processes such as empathy. As theorized by some researchers (e.g. Lemerise and Arsenio, 2000), it is possible that empathy affects adolescents' attention to social information, which would influence how adolescents decode and interpret that information. Deficits in different domains of empathy are related differently to deficits in the early and later stages of SIP.

Analyses examining early stages and later stages of SIP (e.g. Huesmann, 1998) suggested that the SIP stages were not related exclusively to cognitive or affective empathy, but to the individual domains of empathy. Both the early and later stages of SIP mediated the relationship between empathy and antisocial behavior. However, early stages of SIP (hostile attribution bias and access of aggressive responses) were related to the empathy domains of personal distress and perspective taking whereas the later stages of SIP (expectation of punishment and expectation of tangible rewards) were related to empathic concern. These findings suggest that the levels of perspective taking or personal distress may influence what an adolescent initially attends to in a social situation, including decoding and interpreting social information and accessing possible behavioral responses. Empathic concern, on the other hand, may influence the later SIP stages at the point of weighing consequences and deciding upon a response. The relationship of empathic concern and later SIP stages suggests that higher levels empathic concern may inhibit a youth from deciding upon an antisocial response in a social situation. Each of the three empathy domains was related to SIP deficits, but differences in the relationships between the empathy domains and SIP deficits suggest that enhancing specific empathic domains may address different socio-cognitive deficits.

There were significant and pervasive gender differences with regard to one empathy domain: personal distress. As expected, higher personal distress predicted deficits in the early stages of SIP and higher self-reported antisocial behavior, but only for girls. These findings support previous work indicating that personal distress or negative arousal predicts a higher attribution of hostile intent to other people (Frick &

Ellis, 1999) and that females exhibit higher levels of personal distress than males (Davis, 1980; Davis & Franzoi, 1991; Pardini et al, 2003; Perez-Albeniz & de Paul, 2004).

Interestingly, higher personal distress predicted more frequent prosocial responding during later stage SIP (higher expectations of punishment for both girls and boys and fewer expectations of tangible rewards for boys). Thus, greater personal distress may also lead to social cognitions that inhibit antisocial behavior if negative consequences are feared. Previous studies have also found that antisocial youths who exhibit high negative arousal exhibit greater fear of punishment, less focus on gaining tangible rewards, and less antisocial behavior than antisocial youths who exhibit low negative arousal (Frick et al, 2003; Stickle & Frick, 2002). In contrast, for girls personal distress was also related to higher hostile attribution bias, and thus personal distress also predicted higher antisocial behavior. Mitigating the potentially negative effects of high personal distress among antisocial girls, therefore, may require addressing hostile attribution biases.

Girls' higher levels of personal distress and hostile attribution biases are consistent with previous findings that girls with the most severe antisocial behaviors, such as those in juvenile detention, are likely to have experienced different childhood environments than boys with comparable antisocial behaviors. Although most youths who exhibit severe antisocial behavior share experiences and characteristics such as deficits in socialization, higher CU traits, and beliefs about the acceptability of antisocial behavior, there are additional predictors of antisocial behavior for girls.

For example, antisocial girls' hostile attribution biases and personal distress are likely related to difficult or traumatic childhood experiences, mental health, and emotional difficulties. For girls, histories of internalizing disorders and exposure to traumatic experiences including abuse and family or neighborhood violence predict antisocial behavior (Odgers, Moretti, Burnette, Chauhan, Waite, & Reppucci, 2007) and an increased likelihood of involvement with the juvenile justice system (Hubbard & Pratt, 2002; Lederman, Dakof, Larrea, & Li, 2004). Although there are fewer adjudicated girls than boys, these girls appear to have experienced more childhood trauma than boys. In adolescence, the adjudicated girls have more difficulty behaving appropriately in social interactions that are ambiguous or potentially hostile. The current findings suggest that decreasing personal distress or the influence of personal distress on hostile attribution biases may be especially important for antisocial girls. This approach may require screening to assess the need for treatment of internalizing disorders and coping with past traumas.

#### Subtypes of Youths by CU Traits

Hypothesis 3 was not supported. Although SIP mediated the relationship between empathy and antisocial behavior, CU traits did not moderate the mediation. Hypothesis 4, that empathy would predict SIP deficits and antisocial behavior above and beyond CU traits and prior beliefs about aggression, was not supported. Instead, there was a main effect of CU traits. CU traits alone strongly predicted all multiple informant antisocial behavior measures. Although CU traits did not predict self-reported SIP or self-reported

antisocial behavior, youths had different patterns of empathy, SIP, and antisocial behavior depending on their levels of CU traits.

Youths high on CU traits exhibited significantly more antisocial behavior on all measures of antisocial behavior than all other youths, consistent with previous findings (Frick et al, 2005; Hawes & Dadds, 2005). Past studies have shown that antisocial youths high on CU traits exhibit fewer hostile attributions and less distress than antisocial youth low on CU traits (called CU and ICP youths, respectively; Frick & Ellis, 1999; Frick et al, 2003). CU youths have also been shown to exhibit less behavioral inhibition than ICP youths in the face of negative consequences and to also exhibit higher expectations of positive outcomes from antisocial behavior (Frick et al, 2003; Hawes & Dadds, 2005). Consistent with past studies, youths in the current study exhibited trends towards different patterns of empathy and SIP deficits depending on their levels of CU traits. Youths high on CU traits exhibited trends towards lower levels of empathy, including personal distress, and more deficits in SIP, including lower expectations of punishment and higher expectations of tangible rewards, than youths low on CU traits. Boys high on CU traits had significantly fewer hostile attribution biases than boys low on CU traits. This pattern of associations provides partial support to work on the distinct subtypes of CU and ICP youths (Frick & Ellis, 1999; Pardini et al, 2003).

Additionally extending previous work on CU and gender, there were gender differences between youths who exhibited high and low levels of CU traits. Consistent with previous studies, girls exhibited lower levels of CU traits than boys overall (Hawes & Dadds, 2005). However, girls with high CU traits exhibited more antisocial behavior

than boys with high CU traits. This is likely because girls with high CU traits exhibit behaviors far outside the norm and because there are different processes by which antisocial boys and girls are referred for services.

In general, girls with high CU traits are much farther outside the norms than are boys with high CU traits. The base rate of antisocial behavior among girls is small compared to boys, and the number of antisocial girls with significantly elevated CU traits is even smaller. Smaller elevations above the mean of CU traits for girls seem to be related to significant emotional and behavioral deficits. Tiet et al (2001) called this difference a “gender paradox,” wherein girls are more profoundly negatively affected by antisocial behaviors because as a group they exhibit them less frequently. Eme (1992) suggested that this “gender paradox” may be due to different processes by which girls and boys become involved in clinical services, social service agencies, or the juvenile justice system. Girls who are referred for services for antisocial behavior, such as those in the current sample, are those who have extreme levels of CU traits and antisocial behaviors. It is possible that antisocial girls in community samples would exhibit a more even distribution of CU traits and antisocial behavior than adjudicated antisocial girls.

### Gender Differences

In addition to the four hypotheses described above, this study explored gender differences in SIP and antisocial behavior. Consistent with previous studies of adolescents, the current findings show few gender differences in levels of antisocial behavior. There were no gender differences in level of highest-rater antisocial behavior or

on different types of antisocial behavior (e.g. physical versus relational aggression). Although boys exhibit higher levels of antisocial behavior than girls in childhood (e.g. Crick & Grotpeter, 1995; Werner & Crick, 2005), by adolescence girls and boys seem to exhibit roughly equivalent levels of both overall antisocial behavior (McGee et al, 1992) and also different types of antisocial behavior (Tiet et al, 2001). In fact, girls in the current sample had higher levels of self-reported antisocial behavior than boys.

Although there were no gender differences in levels of antisocial behavior, girls and boys exhibited different patterns in the age of onset of antisocial behavior. Consistent with previous research, girls had a later onset of antisocial behavior than boys (Silverthorn & Frick, 1999; Silverthorn et al, 2001). In the current sample, boys' mean age of onset of antisocial behavior fit the characterization of child-onset conduct problems (<10 years old) whereas girls' mean age of onset of antisocial behavior was in the adolescent-onset range (>10 years old). Although an adolescent onset of antisocial behavior is related to less severe or chronic antisocial behavior for boys (e.g. Moffitt et al, 2002), this does not seem to be the case for girls. Although gender and age of onset predict the severity of antisocial behavior in childhood, they are not good predictors of antisocial behavior for adolescents and especially not for girls. In the current sample, CU traits were a better predictor of the severity of antisocial behavior for both girls and boys.

#### Multiple Informant Agreement

Although SIP mediated the relationship between empathy and self-reported antisocial behavior, only perspective taking and CU traits predicted antisocial behavior as

reported by multiple informants (the highest-rater measures). The lack of relationships among three of the empathy factors, SIP, and highest-rater antisocial behavior could be due to several factors. Measures of empathy, SIP, and self-reported antisocial behavior were youth-reported, whereas CU traits and the other antisocial behavior measures were the reports of the highest rater of youth, staff, and teachers. Not surprisingly, there was low agreement between the multiple informants, as has been found in many previous studies of child and adolescent psychopathology (e.g. Achenbach, McConaughy, & Howell, 1987). This study was designed with multiple informants in order to assess multiple perspectives of youths' behaviors. However, much of the information was reported by the adolescents themselves and therefore may have included underreporting of antisocial behavior or CU traits.

Contributing to the lack of agreement, the staff and teachers had been acquainted with the youths for a limited amount of time (as short as 2 weeks). It is possible that staff and teachers had not had sufficient opportunities to observe youths engaged in antisocial behavior due to the highly structured and supervised environment in the juvenile detention centers. Unfortunately, gathering information from parents proved logistically difficult, as many of the youths had been in the custody of the state for many years. An objective measure of youths' antisocial behavior, such as observations, peer ratings, or school records, could be helpful in order to most accurately measure antisocial behavior. Likewise, multiple informant data on empathy and SIP could provide a more complete picture of youths' characteristics.



## Other Limitations

In addition to the limited agreement between multiple informants, there were several other limitations in this study. The participants were adjudicated, mostly Caucasian adolescents in a rural state, so results may not be generalizable to adjudicated adolescents in more ethnically diverse or urban settings or to community samples of adolescents. There were differences on antisocial behavior by ethnicity, but the size of the non-Caucasian ethnic groups was too small to conduct meaningful analyses by ethnicity. Interestingly, the differences by ethnicity were almost entirely on adult-rated measures of antisocial behavior, not on the self-report measures. It is impossible to determine whether staff or youth provided the most accurate ratings. Adult perceptions of youths of different ethnicities will need to be examined in larger samples and across contexts to better understand this discrepancy. Finally, cross-sectional data does not allow for a direct test of the development of empathy, SIP, or antisocial behavior. The current study found relationships among the constructs, but was not able to test the development of adolescents' abilities or deficits. Nevertheless, the present findings add to the literature on important differences between antisocial adolescents based on their CU traits and gender.

## Clinical Implications

Overall, the findings of this study are consistent with previous studies about gender differences in empathy and SIP and the relationship of empathy and SIP to antisocial behavior. There was also evidence supporting distinct subtypes of antisocial

adolescents. Limitations in the current study preclude making concrete recommendations for treating antisocial adolescents. However, the results indicate that antisocial adolescents exhibit deficits in empathy and SIP that need to be addressed and that these deficits differ by gender and levels of CU traits. Differences between girls and boys and between CU and ICP youths have important implications in designing and implementing interventions for antisocial adolescents.

There are many empirically-supported interventions designed to reduce adolescent antisocial behavior, and each intervention targets different deficits. For example, cognitive treatments and context-changing treatments such as parent training are integral parts of effective treatment for antisocial behavior (Brestan & Eyberg, 1998; Kazdin, Siegel, & Bass, 1992; Lochman, Burch, Curry, & Lampron, 1984). However, many of the best, empirically-supported interventions produce only small reductions in antisocial behavior (Brestan & Eyberg, 1998). The findings of the current study and previous literature suggest that interventions for antisocial behavior may be more effective when they are targeted to adolescents' patterns of deficits. For example, although behavioral parent training has been shown to be effective in reducing the antisocial behavior of youth low on CU traits, it is less effective for youths high on CU traits. This is likely due to different emotional and socio-cognitive characteristics of CU youths, including a lack of responsiveness to negative consequences such as time-out (Hawes & Dadds, 2005; Stickle & Frick, 2002). Additionally, the current findings of differences between girls' and boys' deficits in empathy and SIP suggest that girls may

benefit from interventions focused on decreasing negative arousal and hostile attribution biases.

In addition to addressing adolescents' cognitive and emotional deficits, interventions must also be multifaceted. One consistent finding throughout the literature on antisocial adolescents is that focusing on increasing adolescents' empathic and socio-cognitive skills is not sufficient for youths high on CU traits or with chronic antisocial behavior (Stickle & Frick, 2002). Adolescents with high levels of CU traits or chronic antisocial behavior, such as those in the current study, will benefit from broadly-conceived, community-based interventions that address multiple processes and contexts (Kazdin, 1996; Stickle & Frick, 2002). Interventions such as FAST Track (Conduct Problems Prevention Research Group, 1999) and Multisystemic Therapy (Henggler, Schoenwald, Borduin, Rowland, & Cunningham, 1998) involve multiple professionals from multiple agencies developing an individualized plan that includes academic, cognitive, empathic, and contingency management interventions for the youth and his immediate support system. These broad interventions have been effective with the most chronically antisocial youths (e.g. Henggler et al, 1998).

One major limitation of these broad, individualized interventions, however, is the investment of professionals and time needed for their implementation and coordination. Continued research on the antisocial behavior of CU and ICP youths may help to more effectively and economically tailor these interventions to distinct target populations. More specific targeting of interventions by gender may also improve the delivery of services and therefore the treatment of adolescent antisocial behavior. Studies of

interventions specific to antisocial girls up to this point have focused primarily on decreasing relational aggression (e.g. Cappella & Weinstein, 2006). More research is needed to develop effective interventions for antisocial adolescent girls. Overall, a better understanding of the subtypes of antisocial adolescents may allow for the implementation of targeted, multifaceted interventions to address specific deficits and more effectively decrease adolescent antisocial behavior.

Table 1

*Means and Standard Deviations of Demographic Variables for Girls and Boys*

	Girls ( <i>n</i> = 60)		Boys ( <i>n</i> = 90)	
	Mean	SD	Mean	SD
Age at interview	15.33	1.35	15.12	1.44
Age of onset of antisocial behavior*	12.03	2.77	9.82	3.48
Age at first arrest	13.67	1.94	13.17	2.03

Note. \*Significant difference between girls and boys,  $p < .001$

Table 2

*Number of Girls and Boys of Each Ethnic Group*

Ethnic Group	% of Sample	Number of Girls ( <i>n</i> = 60)	Number of Boys ( <i>n</i> = 90)
Caucasian	85%	52	76
African-American	3%	1	4
Hispanic	5%	4	4
Other	6%	3	6

Table 3

*Means and Standard Deviations of IRI Scales for Adjudicated and Normative Samples*

	Adjudicated youth sample		10 <sup>th</sup> grade normative sample (Davis & Franzoi, 1991)	
	Girls (n=60)	Boys (n=90)	Girls (n=102)	Boys (n=103)
	Mean (SD)	Mean (SD)	Mean	Mean
Perspective taking	14.40 (5.10)	12.93 (4.90)	16.88	15.05
Empathic concern*	19.20 (4.31)	16.20 (4.88)	20.24	18.43
Personal distress*	14.53 (4.92)	9.13 (4.66)	13.06	11.36
Fantasy	12.83 (6.45)	12.22 (5.16)	17.39	14.60

Note. \*Significant difference between means of adjudicated girls and boys,  $p < .05$ . In the 10<sup>th</sup> grade normative sample, girls and boys differed significantly on all four empathy subscales ( $p < .01$ , Davis & Franzoi, 1991).

Table 4

*Means and Standard Deviations of SIP, Antisocial Behavior, and Callous-Unemotional Trait Variables for Girls and Boys*

	Girls ( <i>n</i> = 60)	Boys ( <i>n</i> = 90)
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Note. \*Significant difference between means of girls and boys,  $p < .05$ .

		Mean (SD)	Mean (SD)
SIP	Hostile attribution bias*	5.81 (2.61)	4.30 (2.35)
	Expectation of tangible rewards	6.88 (3.35)	6.55 (3.25)
	Expectation of punishment	18.18 (4.74)	17.32 (3.92)
	Reduction of aversive treatment	10.45 (3.96)	8.64 (2.98)
	Access of aggressive responses*	14.15 (10.22)	10.28 (8.33)
Antisocial behavior	Aggressive response choices*	4.25 (3.18)	3.16 (2.63)
	Delinquent behavior	13.40 (3.37)	12.96 (3.50)
	Aggressive behavior	25.95 (10.97)	24.53 (10.04)
	Proactive aggression	5.65 (2.46)	5.14 (1.86)
	Reactive aggression	6.68 (2.18)	6.79 (2.04)
Callous-unemotional traits*		44.70 (6.90)	47.70 (5.09)



Table 5

*Correlations Between Age, Empathy, and All Study Variables for Girls (n=60)*

	Age	Perspective taking	Empathic concern	Personal distress	Fantasy
Perspective taking	.10				
Empathic concern	.19	.44***			
Personal distress	-.08	-.24 <sup>t</sup>	.10		
Fantasy	.15	.46***	.37**	-.08	
Hostile attribution bias	-.12	-.28*	-.13	.49***	-.08
Expect. tangible	.09	-.23	-.25 <sup>t</sup>	-.17	-.14
Expect. punishment	.13	.22	.29*	.31*	.13
Reduction of avers.	-.01	-.27*	-.05	-.00	-.25 <sup>t</sup>
Access of agg. responses	-.25 <sup>t</sup>	-.42***	-.22	.35**	-.04
Agg. response choices	-.27*	-.42***	-.33*	.26*	-.09
Delinquent behavior	-.12	-.24 <sup>t</sup>	-.31*	-.14	-.21
Aggressive behavior	-.20	-.36**	-.17	.06	-.31*
Proactive aggression	-.11	-.32*	-.21	.04	-.17
Reactive aggression	-.02	-.32*	-.18	.08	-.27*
CU traits	-.44**	-.42***	-.37**	.02	-.34**
Prior beliefs agg.	-.20	-.42**	-.37**	.11	-.31*

Note. Age = age at time of interview. Expect. tangible = Expectation of tangible rewards. Expect. punishment = Expectation of punishment. Reduction of avers. = Reduction of aversive treatment. Access of agg. respon. = Access of aggressive responses. Agg. response choices = Aggressive response choices. Prior beliefs agg. = Prior beliefs about aggression. <sup>t</sup>  $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 6

*Correlations Between SIP Stages and Antisocial Behavior Outcomes for Girls (n=60)*

	Hostile attribution bias	Expect. tangible	Expect. punishment	Reduction of avers.	Access of agg. respon.
Expect. tangible	-.04				
Expect. punishment	.04	-.20			
Reduction of avers.	-.09	.27*	-.16		
Access of agg. respon.	.59***	.24 <sup>t</sup>	-.19	.22	
Agg. response choices	.62***	.27*	-.29*	.17	.58***
Delinquent behavior	.01	.04	-.11	-.01	.07
Aggressive behavior	.17	-.17	.00	-.06	.18
Proactive aggression	.20	.15	-.23	.01	.20
Reactive aggression	.30*	.07	-.23	-.03	.19
CU traits	.15	.08	-.33**	.01	.33*
Prior beliefs agg.	.32*	.29*	-.45***	.34**	.52***

Note. Expect. tangible = Expectation of tangible rewards. Expect. punishment = Expectation of punishment. Reduction of avers. = Reduction of aversive treatment. Access of agg. respon. = Access of aggressive responses. Agg. response choices = Aggressive response choices. Prior beliefs agg. = Prior beliefs about aggression.

<sup>t</sup> $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 7

*Correlations Between Antisocial Behavior Outcomes for Girls (n=60)*

	Agg. response choices	Delinq. behavior	Agg. behavior	Proactive agg.	Reactive agg.	CU traits
Delinq. behavior	.09					
Agg. behavior	.19	.64***				
Proactive agg.	.31*	.33**	.45***			
Reactive agg.	.29*	.40**	.57***	.81***		
CU Traits	.41**	.38**	.44***	.40**	.48***	
Prior beliefs agg.	.65***	.20	.11	.21	.31*	.54***

Note. Agg. response choices = Aggressive response choices. Agg. behavior = Aggressive behavior. Delinq. behavior = Delinquent behavior. Proactive agg. = Proactive aggression. Reactive agg. = Reactive aggression. Prior beliefs agg. = Prior beliefs about aggression. <sup>t</sup> $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 8

*Correlations Between Age, Empathy, and All Study Variables for Boys (n=90)*

	Age	Perspective taking	Empathic concern	Personal distress	Fantasy
Perspective taking	.04				
Empathic concern	.03	.47***			
Personal distress	-.16	-.07	.17		
Fantasy	-.02	.40***	.36***	.15	
Hostile attribution bias	-.17	-.28**	-.18	-.01	-.19
Expect. tangible	.22*	-.24*	-.20 <sup>t</sup>	-.32**	-.09
Expect. punishment	-.21*	.19	.16	.25*	-.02
Reduction of avers.	.02	-.06	-.11	-.15	.04
Access of agg. responses	-.14	-.24*	-.21 <sup>t</sup>	.08	-.04
Agg. response choices	-.02	-.26*	-.29**	-.09	-.12
Delinquent behavior	-.14	-.11	.02	-.09	.12
Aggressive behavior	-.22*	-.03	.10	.19	.19
Proactive aggression	.02	-.21*	-.13	-.17	.01
Reactive aggression	-.12	-.10	-.01	.10	.09
CU traits	-.18	-.17	-.13	.06	.04
Prior beliefs agg.	.16	-.30**	-.35***	-.30**	-.19 <sup>t</sup>

Note. Age = age at time of interview. Expect. tangible = Expectation of tangible rewards. Expect. punishment = Expectation of punishment. Reduction of avers. = Reduction of aversive treatment. Access of agg. respon. = Access of aggressive responses. Agg. response choices = Aggressive response choices. Prior beliefs agg. = Prior beliefs about aggression. <sup>t</sup> $p < .07$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 9

*Correlations Between SIP Stages and Antisocial Behavior Outcomes for Boys (n=90)*

	Hostile attribution bias	Expect. tangible	Expect. punishment	Reduction of avers.	Access of agg. respon.
Expect. tangible	.09				
Expect. punishment	.07	-.48***			
Reduction of avers.	.05	.27*	-.16		
Access of agg. respon.	.40**	.05	-.06	.13	
Agg. response choices	.46***	.21*	-.32**	.20 <sup>t</sup>	.58***
Delinquent behavior	-.04	.14	-.17	.09	.01
Aggressive behavior	-.08	-.07	-.03	-.07	.11
Proactive aggression	.06	.26*	-.24*	.03	.10
Reactive aggression	-.12	.07	-.21*	.03	-.01
CU traits	-.09	.10	-.17	.00	.16
Prior beliefs agg.	.26*	.51***	-.39***	.35***	.35***

Note. Expect. tangible = Expectation of tangible rewards. Expect. punishment = Expectation of punishment. Reduction of avers. = Reduction of aversive treatment. Access of agg. respon. = Access of aggressive responses. Agg. response choices = Aggressive response choices. Prior beliefs agg. = Prior beliefs about aggression. <sup>t</sup>  $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 10

*Correlations Between Antisocial Behavior Outcomes for Boys (n=90)*

	Agg. response choices	Delinq. behavior	Agg. behavior	Proactive agg.	Reactive agg.	CU traits
Delinq. behavior	.17					
Agg. behavior	.15	.60***				
Proactive agg.	.25*	.46***	.52***			
Reactive agg.	.08	.34***	.58***	.51***		
CU Traits	.19 <sup>t</sup>	.34**	.35***	.24*	.29**	
Prior beliefs agg.	.49***	.19	-.02	.22*	-.01	.21*

Note. Agg. response choices = Aggressive response choices. Agg. behavior = Aggressive behavior. Delinq. behavior = Delinquent behavior. Proactive agg. = Proactive aggression. Reactive agg. = Reactive aggression. Prior beliefs agg. = Prior beliefs about aggression. <sup>t</sup> $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 11

*Means and Standard Deviations for the Six Categories of Aggressive Response Choices for Girls and Boys*

	Girls ( <i>n</i> = 60)	Boys ( <i>n</i> = 90)
	Mean (SD)	Mean (SD)
Problem solving	5.72 (2.90)	6.39 (2.63)
Withdrawal	2.00 (1.71)	2.44 (1.64)
Physical aggression	1.28 (1.78)	0.96 (1.13)
Relational aggression	0.92 (1.12)	0.69 (0.96)
Verbal aggression	1.35 (1.44)	1.01 (1.16)
Covert aggression	0.70 (1.28)	0.49 (1.02)

Note. None of the means differed significantly between girls and boys.

Table 12

*Correlations Between Empathy and Aggressive Response Choices for Girls (n=60)*

	Problem solving	With- drawal	Relational agg.	Physical agg.	Verbal agg.	Covert agg.
Withdrawal	-.13					
Relational agg.	-.55***	-.11				
Physical agg.	-.58***	-.39**	.22			
Verbal agg.	-.35**	-.05	.04	-.05		
Covert agg.	-.43***	-.32*	.18	.32*	-.20	
Perspective taking	.46***	-.01	-.20	-.31*	-.16	-.23
Empathic concern	.25 <sup>t</sup>	.22	-.26*	-.27*	-.02	-.22
Personal distress	-.33**	.09	.18	.11	.00	.24**
Fantasy	.22	-.20	-.14	-.03	-.11	.07

Note. Relational agg. = Relational aggression. Physical agg. = Physical aggression. Verbal agg. = Verbal aggression. Covert agg. = Covert aggression. <sup>t</sup>  $p < .07$  \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$



Table 13

*Correlations Between Empathy and Aggressive Response Choices for Boys (n=90)*

	Problem solving	With- drawal	Relational agg.	Physical agg.	Verbal agg.	Covert agg.
Withdrawal	-.31**					
Relational agg.	-.45***	-.28**				
Physical agg.	-.61***	-.11	.21*			
Verbal agg.	-.46***	-.15	.22*	.10		
Covert agg.	-.45***	-.25*	.20 <sup>t</sup>	.36***	-.02	
Perspective taking	.33***	-.12	.01	-.29**	-.15	-.15
Empathic concern	.24*	.09	-.15	-.28**	-.01	-.28**
Personal distress	.13	-.10	.04	-.07	-.15	.02
Fantasy	.16	-.06	-.04	-.17	-.05	-.03

Note. Relational agg. = Relational aggression. Physical agg. = Physical aggression.  
 Verbal agg. = Verbal aggression. Covert agg. = Covert aggression. <sup>t</sup> $p < .07$  \*  $p < .05$   
 \*\* $p < .01$  \*\*\* $p < .001$

Table 14

*Hostile Attribution Bias Mediates the Relationship Between Perspective Taking and Aggressive Response Choices for Girls and Boys, Controlling for CU Traits (n=150)*

	Standardized Beta					
	<u>Both Girls and Boys</u>		<u>Girls Only</u>		<u>Boys Only</u>	
	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$
CU traits	.24**		.19		.25*	
Perspective taking	-.10	(-.26***)	-.18	(-.32*)	-.08	(-.24*)
Hostile attribution bias	.53***		.52***		.48***	
$\Delta R^2$	.35***		.47***		.24***	

Note. Standardized beta coefficients reported. Sobel test on indirect effect for model with both girls and boys,  $z = -3.36$ ,  $p < .001$ . Sobel test for boys,  $z = -2.72$ ,  $p < .01$ . Although a similar pattern was evident for girls, the Sobel test on the indirect effect was not significant for girls.  $\Delta R^2 = \text{Adjusted } R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 15

*Access of Aggressive Responses Mediates the Relationship Between Perspective Taking and Aggressive Response Choices for Girls and Boys, Controlling for CU Traits (n=150)*

	Standardized Beta					
	<u>Both Girls and Boys</u>		<u>Girls Only</u>		<u>Boys Only</u>	
	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$
CU traits	.09		.11		.07	
Perspective taking	-.09	(-.26**)	-.04	(-.32*)	-.13	(-.24*)
Access agg. responses	.67***		.76***		.58***	
$\Delta R^2$	.51***		.69***		.34***	

Note. Access. agg. responses = Access of aggressive responses. Controlling for covariates age and ethnicity. Standardized beta coefficients reported. Sobel test on indirect effect for model with both girls and boys,  $z = -3.11$ ,  $p < .01$ . Sobel test for girls,  $z = -2.61$ ,  $p < .01$ . Although a similar pattern was evident for boys, the Sobel test on the indirect effect was not significant for boys.  $\Delta R^2 = \text{Adjusted } R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 16

*Hostile Attribution Bias Mediates the Relationship Between Personal Distress and Aggressive Response Choices for Girls Only, Controlling for Callous-Unemotional Traits (n=60)*

	Standardized Beta	
	<u>Girls Only</u>	
	$\beta$	Total effect $\beta$
Callous-unemotional traits	.27*	
Personal distress	-.03	(.25*)
Hostile attribution bias	.57***	
$\Delta R^2$	.45***	

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported. Sobel test on indirect effect for model with girls,  $z = 3.24$ ,  $p < .01$ .  $\Delta R^2$  = Adjusted  $R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 17

*Access of Aggressive Responses Mediates the Relationship Between Personal Distress and Aggressive Response Choices for Girls Only, Controlling for Callous-Unemotional Traits (n=60)*

	Standardized Beta	
	<u>Girls Only</u>	
	$\beta$	Total effect $\beta$
Callous-unemotional traits	.13	
Personal distress	-.02	(.25*)
Access of aggressive responses	.78***	
$\Delta R^2$	.69***	

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported. Sobel test on indirect effect for model with girls,  $z = 2.76$ ,  $p < .01$ .  $\Delta R^2$  = Adjusted  $R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 18

*Expectation of Punishment Mediates the Relationship Between Empathic Concern and Aggressive Response Choices for Girls and Boys (n=150)*

	Standardized Beta					
	<u>Both Girls and Boys</u>		<u>Girls Only</u>		<u>Boys Only</u>	
	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$
Empathic concern	-.25**	(-.31***)	-.21	(-.25 <sup>†</sup> )	-.25*	(-.31**)
Expectation of punishment	-.25**		-.18		-.29**	
$\Delta R^2$	.17***		.14*		.13**	

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported. Sobel test on indirect effect for model with both girls and boys,  $z = -2.09$ ,  $p < .05$ . Although a similar pattern was evident for both girls and boys analyzed separately, the Sobel test on the indirect effect was not significant for either separate gender group.  $\Delta R^2 = \text{Adjusted } R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, <sup>†</sup> $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 19

*Expectation of Tangible Rewards Mediates the Relationship Between Empathic Concern and Aggressive Response Choices for Girls and Boys (n=150)*

	Standardized Beta					
	<u>Both Girls and Boys</u>		<u>Girls Only</u>		<u>Boys Only</u>	
	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$	$\beta$	Total effect $\beta$
Empathic concern	-.26**	(-.31***)	-.19	(-.25 <sup>†</sup> )	-.27*	(-.31**)
Tangible rewards	.20*		.24 <sup>†</sup>		.17	
$\Delta R^2$	.14***		.16**		.08*	

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported. Sobel test on indirect effect for model with both girls and boys,  $z = -1.91$ ,  $p < .07$ . Although a similar pattern was evident for both girls and boys analyzed separately, the Sobel test on the indirect effect was not significant for either separate gender group.  $\Delta R^2 = \text{Adjusted } R^2$ . Total effect  $\beta$  is the association between the independent and dependent variables without the mediator, <sup>†</sup> $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 20

*Personal Distress Predicts Expectation of Punishment for Girls and Boys, Controlling for Callous-Unemotional Traits (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Callous-unemotional traits	-.27**	-.30*	-.22*
Personal distress	.25**	.30*	.23*
$\Delta R^2$	.14***	.16**	.10*

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 21

*Personal Distress Predicts Expectation of Tangible Rewards for Boys Only, Controlling for Callous-Unemotional Traits (n=90)*

	Standardized Beta
	<u>Boys Only</u>
	$\beta$
Callous-unemotional traits	.17
Personal distress	-.31**
$\Delta R^2$	.12**

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*\*  $p < .01$ .

Table 22

*Prior Beliefs about Aggression Predict Aggressive Response Choices for Girls and Boys (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Prior beliefs about aggression	.50***	.54***	.47***
Callous-unemotional traits	.00	-.04	.06
Perspective taking	-.13	-.20	-.11
$\Delta R^2$	.30***	.41***	.23***

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*\*\*  $p < .001$

Table 23

*Callous-Unemotional Traits Predict Proactive Aggression for Girls and Boys (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Prior beliefs about aggression	.06	-.08	.11
Callous-unemotional traits	.18 <sup>†</sup>	.33 <sup>†</sup>	.15
Perspective taking	-.17*	-.19	-.18
$\Delta R^2$	.12***	.15*	.08*

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . <sup>†</sup>  $p < .07$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 24

*Callous-Unemotional Traits Predict Reactive Aggression for Girls and Boys (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Prior beliefs about aggression	-.06	-.09	.01
Callous-unemotional traits	.35***	.28*	.49**
Perspective taking	-.11	-.07	-.12
$\Delta R^2$	.13***	.05	.25**

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 25

*Callous-Unemotional Traits Predict Aggressive Behavior for Girls and Boys (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Prior beliefs about aggression	-.12	-.26	-.07
Callous-unemotional traits	.31***	.45**	.30**
Perspective taking	-.10	-.26*	-.02
$\Delta R^2$	.14***	.21**	.12**

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 26

*Callous-Unemotional Traits Predict Delinquent Behavior for Girls and Boys (n=150)*

	Standardized Beta		
	<u>Both Girls and Boys</u>	<u>Girls Only</u>	<u>Boys Only</u>
	$\beta$	$\beta$	$\beta$
Prior beliefs about aggression	.08	-.02	.13
Callous-unemotional traits	.25**	.38*	.25*
Perspective taking	-.04	-.10	-.04
$\Delta R^2$	.09**	.07	.10*

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*  $p < .05$ . \*\*  $p < .01$ .

Table 27

*Fantasy Predicts Aggressive Behavior for Girls (n=60)*

	<u>Girls Only</u>
	$\beta$
Fantasy	-.27*
$\Delta R^2$	.08*

Note. Controlling for covariates age and ethnicity. Standardized beta coefficients reported.  $\Delta R^2$  = Adjusted  $R^2$ . \*  $p < .05$ .

Table 28

*Means and Standard Deviations for Girls With Low, Medium, and High Callous-Unemotional Traits*

	Low CU traits ( <i>n</i> = 7)	Medium CU traits ( <i>n</i> = 43)	High CU traits ( <i>n</i> = 10)
Callous-unemotional traits	34.71 <sup>a</sup> (2.43)	43.49 <sup>b</sup> (2.88)	56.90 <sup>c</sup> (4.43)
Youth age at interview	16.14 <sup>a</sup> (0.90)	15.44 <sup>a</sup> (1.33)	14.30 <sup>b</sup> (1.16)
Perspective taking	17.29 <sup>a</sup> (3.90)	14.79 <sup>ab</sup> (5.11)	10.70 <sup>b</sup> (3.97)
Empathic concern	21.14 <sup>a</sup> (4.53)	19.74 <sup>a</sup> (3.61)	15.50 <sup>b</sup> (5.30)
Personal distress	10.86 (6.36)	15.40 (4.40)	13.40 (5.10)
Fantasy	16.29 (6.73)	13.21 (6.33)	8.80 (5.20)
Hostile attribution bias	3.71 (2.50)	5.37 (2.61)	5.40 (2.59)
Access of aggressive responses	11.57 (8.83)	13.05 (10.22)	20.70 (9.32)
Expectation of punishment	17.29 <sup>ab</sup> (4.89)	19.21 <sup>a</sup> (3.95)	14.40 <sup>b</sup> (6.10)
Expectation of tangible rewards	8.14 (2.27)	6.33 (3.67)	8.40 (1.35)
Aggressive response choices	2.71 <sup>a</sup> (1.98)	3.93 <sup>a</sup> (3.21)	6.70 <sup>b</sup> (2.54)
Aggressive behavior	19.71 <sup>a</sup> (6.21)	24.74 <sup>a</sup> (10.56)	35.50 <sup>b</sup> (10.23)
Delinquent behavior	12.00 <sup>a</sup> (3.42)	13.05 <sup>a</sup> (3.27)	15.90 <sup>b</sup> (2.77)
Proactive aggression	4.43 <sup>a</sup> (1.81)	5.42 <sup>a</sup> (2.43)	7.50 <sup>b</sup> (2.12)
Reactive aggression	5.43 <sup>a</sup> (1.81)	6.47 <sup>a</sup> (2.00)	8.50 <sup>b</sup> (2.27)

Note. Means with different letters are significantly different,  $p < .05$ .



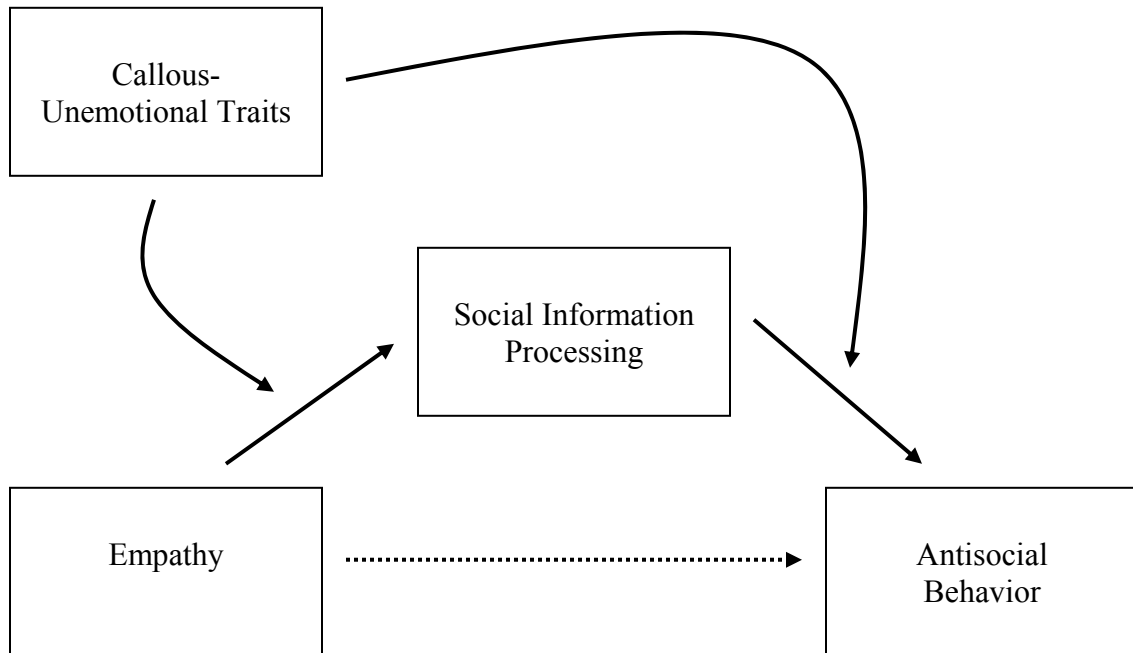
Table 29

*Means and Standard Deviations for Boys With Low, Medium, and High Callous-Unemotional Traits*

	Low CU traits ( <i>n</i> = 14)	Medium CU traits ( <i>n</i> = 60)	High CU traits ( <i>n</i> = 16)
Callous-unemotional traits	40.21 <sup>a</sup> (1.63)	47.47 <sup>b</sup> (2.90)	55.13 <sup>c</sup> (2.68)
Youth age at interview	15.64 (1.47)	15.07 (1.36)	14.88 (1.67)
Perspective taking	14.29 (5.54)	13.05 (4.50)	11.31 (5.64)
Empathic concern	18.36 (5.21)	15.93 (4.41)	15.31 (5.96)
Personal distress	9.43 (5.23)	8.88 (4.60)	9.81 (4.67)
Fantasy	12.43 (4.91)	12.03 (5.39)	12.75 (4.77)
Hostile attribution bias	4.43 (1.95)	4.33 (2.52)	4.06 (2.08)
Access of aggressive responses	7.38 (5.61)	10.37 (8.40)	12.50 (9.67)
Expectation of punishment	18.00 <sup>a</sup> (3.55)	17.55 <sup>a</sup> (4.09)	15.88 <sup>b</sup> (3.44)
Expectation of tangible rewards	5.93 (3.54)	6.62 (3.05)	6.88 (3.84)
Aggressive response choices	2.71 (2.16)	3.02 (2.61)	4.06 (3.02)
Aggressive behavior	19.79 <sup>a</sup> (8.35)	23.88 <sup>a</sup> (9.86)	31.13 <sup>b</sup> (9.32)
Delinquent behavior	11.43 <sup>a</sup> (3.27)	12.73 <sup>a</sup> (3.38)	15.13 <sup>b</sup> (3.28)
Proactive aggression	4.43 (1.74)	5.13 (1.86)	5.81 (1.83)
Reactive aggression	5.43 <sup>a</sup> (1.87)	6.87 <sup>ab</sup> (2.02)	7.69 <sup>b</sup> (1.70)

Note. Means with different letters are significantly different,  $p < .05$ .

*Figure 1.* The hypothesized moderated mediation model.



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